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Railway Age

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Railway Age

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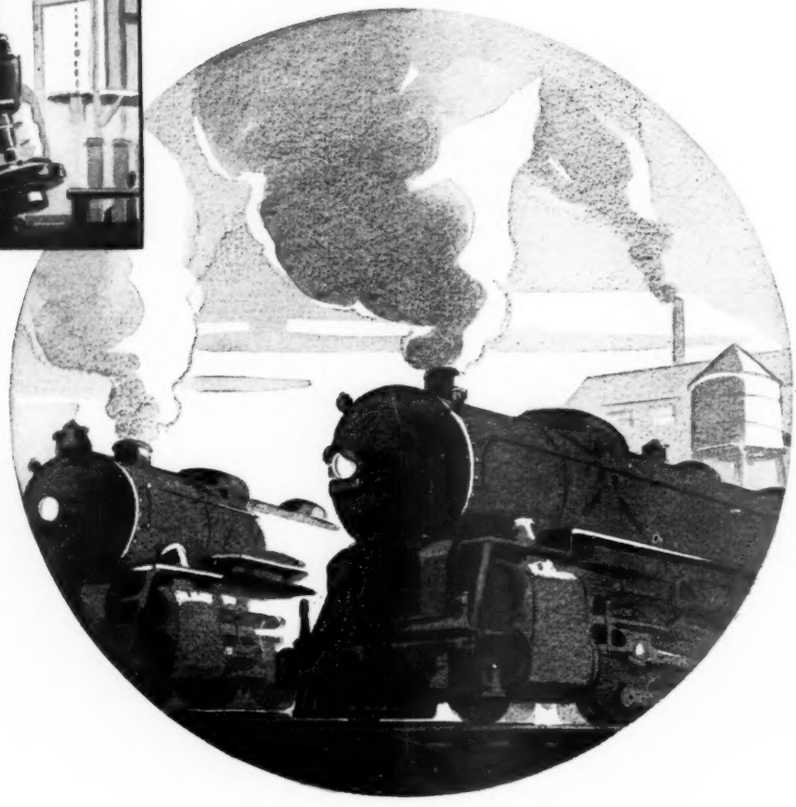

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RAILWAY AGE

How to Increase Railway Employment

The only way under present conditions to increase employment on the railways is to increase the volume of passenger and freight traffic carried by rail. Railway labor leaders and employees sometimes indicate that they recognize this fact, which is of vital importance to both the railways and the employees. They recognized it by effectively supporting the Motor Carrier regulation act passed at the last session of Congress. They are recognizing it by supporting the Pettengill bill to repeal the long-and-short-haul section of the Interstate Commerce Act. The purpose of both is to enable the railways to recover traffic by making less unequal the conditions of competition between them and other carriers.

Why do not labor leaders and employees see that any other measures that will help to increase railway traffic will help to increase railway employment, and, by the same token, that any measures that will drive traffic away from the railways will also reduce employment on them?

Frequency of Service and Labor Costs

One of the principal things that the railways need to do in order to increase their traffic, and thereby make it practicable to increase the number of their employees, is to increase the frequency of both their freight and passenger service. This is because one of the principal reasons why they have lost so much passenger and freight traffic to private automobiles, buses and trucks is that the private automobile can be used at any time, and that in many or most territories buses and trucks depart from and arrive at their terminals more frequently than do railway trains. Buses and trucks can leave and arrive more frequently than trains because each of them is less expensive to operate than a train. The railways can meet the competition of this more frequent bus and truck service only by either engaging in the operation of buses and trucks themselves or by rendering a more frequent service by rail.

But immediately they consider or attempt a more frequent service by rail they are confronted with a great obstacle. This is, that the railway labor unions not only demand that they shall pay higher wages per hour to railway employees than are paid to bus and truck employees, but, also, that they shall employ more men on vehicles of any kind that are operated by rail than are employed on each bus or truck. If these demands are granted the result is to make the labor costs of operating a train or any other unit of service by rail, however small the unit may be, much higher than the labor costs of operating a bus or truck. If the labor costs of operating each train or other unit of service by rail must be much higher than the labor costs of operating a bus or truck, then the railways must handle more passengers or freight in each train or other unit of service to make the train or other unit of service earn enough to bear its greater labor costs. But the more passengers or freight are handled in each train or other unit of service by rail, the less is the number of trains or other units operated by rail, and the smaller is the frequency of rail service. It follows that by effectively insisting upon "full crews" on every train or other unit of service operated by rail, the labor unions make it impracticable for the railways to increase the frequency of their service enough to meet the competition of buses and trucks in many territories, and much more difficult or impossible for them to meet the competition of the private automobile.

Why Highway Competition Destroys Railway Employment

The publication "Labor" quotes us as saying (in our November 30 issue) that the interest of the railways in motor transport enterprises has more than trebled since last year, and remarks that we are silent on the effect of this development "upon railroad workers who are being deprived of jobs."

We are silent on the point because it does not exist. In many or most instances the interest of the railways in motor transport enterprises has increased in the last year because of acquisition by them of motor transport lines already being operated. The service rendered

by the motor transport lines acquired by the railways has not been substituted for rail service previously rendered by the railways, and consequently their acquisition by the railways has not deprived any railway employees of their jobs.

Motor transport has deprived, and is depriving, railroad workers of jobs, but this arises from contrasting conditions surrounding motor transport, on the one hand, and the railroads, on the other. Whether the motor carriers happen to be owned by a railway or other person or corporations has very little to do with their taking jobs from railroad employees.

Buses and trucks are taking employment away from railroad men for four reasons—none of them even remotely connected with who owns them. These reasons are: (1) For some transportation tasks the bus and truck are economically superior to the railroad; (2) highway carriers work their men longer hours at lower wages than railroad employees command; (3) highway transportation is not self-sustaining and tax-yielding to the extent that the railroads are; and (4) the regulation of the railroads is so much more severe than that of their highway competitors. These traffic-diverting conditions exist under independent operation probably even more to the disadvantage of railroad workers than they do under railroad ownership of these carriers. At least railroad operators of motor vehicles have not gone to the same lengths of low wages and long hours for their employees as independent operators on the highways. To that extent railroad operation of motor vehicles deprives fewer railroad employees of their jobs, than does independent operation.

Railway Labor Costs Drive Traffic Away

The *Railway Age* favors motor transportation wherever it can be shown that such operation has inherent economic advantages—but the transfer of traffic from the rail to the highway often takes place when no inherent advantage exists in favor of the highway. Instead, the diversion is often made not only because of governmental favors to highway carriers, but also because the archaic working rules and excess crew agreements with the transportation brotherhoods have expanded train operating costs to fantastic levels. A bus or truck fitted to run on rails can do so at a lower fuel cost than a similar vehicle on the highway. But as long as the bus or truck on the highway is operated by one man willing to put in a day of eight hours for his pay, while a similar vehicle on rails has to be cluttered up with one or more deadheads each of whom gets a day's pay for every 100 miles run, highway transport will continue to capture jobs which the railway labor organizations could retain for their members if they would face economic facts that are equally beyond their own control and that of the railways.

In the old days when the railroad had a transportation monopoly the unions' tactics of requiring supernumerary employees and pay for time not worked operated very well for them. The shippers had to pay the cost because they had no alternative. But now, even with thoroughgoing truck regulation, railway rates cannot, without loss of railway traffic and employment, be made so high that a shipper will save money by using a truck. In passenger service rates have got to be low enough and service sufficiently frequent and otherwise attractive to induce the prospective passenger to refrain from using a bus or to leave his automobile. These are facts which face organized railway labor today—and railway managements cannot protect the employees from their effects. Either the unions will recognize them and modify the more unreasonable of their exactions so that the railways can provide cheap and frequent service—or railway employment will continue to suffer.

Gross Earnings Determine Compensation

The railway labor leaders continue to try to increase the total compensation paid to railway employees by coercive methods. They try to force increases in total compensation by threats of strikes for higher wages and for the employment of men where they are not needed. When threats of strikes fail they seek to compel increases in wages and employment by legislation. The ineffectiveness of both these methods for increasing the *total compensation* of railway employees is easily demonstrable.

The world is full today of plans for establishing economic perpetual motion. Such plans, like those for establishing perpetual motion in the physical world, always fail because there are economic laws as well as natural laws, the operation of which no human power of contrivance or coercion can prevent. The efforts of the labor unions to increase both wages and employment on the railways regardless of the volume of traffic handled and the gross earnings derived from it are simply one of the numerous attempts being made to establish economic perpetual motion.

The total amount of compensation that the railways will or can pay their employees is determined, in the long run, by just one thing. This is the amount of gross earnings that they make. Their gross earnings are determined by their rates and the amount of passenger and freight traffic that they handle. They cannot increase their rates in the teeth of present competition. Consequently a decline of their traffic unaccompanied by a reduction of wages, or an increase of wages unaccompanied by an increase of traffic, inevitably results in a reduction of the number of employees. On the other hand, an increase of traffic, unaccompanied by increase of average wages, inevitably results in an increase in the number of employees.

There were seven years of prosperity and five years of depression in the period of twelve years 1923-1934, inclusive. In the seven years of prosperity the total payroll averaged 43.4 per cent of gross earnings. In the five years of depression it averaged 45 per cent. In the entire period of twelve years it averaged 44.1 per cent. In 1934 it was 44.1—exactly the same as the

average for the twelve years. The number of employees ranged during this period from as high as 1,857,674 in 1923 to as low as 971,196 in 1933, and there were changes in wages, but the proportion of gross earnings paid out in total compensation to employees was always tending to come back to the same point, being 44.3 per cent of gross earnings in 1923, when the number of employees was the largest, and 43.2 per cent in 1933, when it was the smallest.

Higher Wages—Fewer Employees

The deduction of 10 per cent from basic wages was fully restored on April 1, 1935, and the higher average wage was, therefore, in effect throughout the seven months April-October, inclusive, 1935. In the first four months of this period gross earnings were about the same as in 1934, and the average number of employees was 39,197 less. In the last three months of the period, gross earnings were larger than in 1934, and the average number of employees was only 8,605 less. In October gross earnings made the largest increase over 1934, and the number of employees was 5,031 larger than in October, 1934—the first month in which there had not been a decline in the number of employees as compared with the number in the corresponding month of the previous year since August, 1934.

In the face of this conclusive evidence that the amount of traffic that the railways handle in future will determine the number of persons that they can and will employ at present wages, it would seem that the railway labor leaders would be not only utilizing every opportunity offered, but seeking every practicable opportunity, to co-operate with the railways to the end of increasing the volume of traffic handled by rail. The problem of railway employment is not at all the problem of increasing the number of men employed to handle present or even prospective traffic. It is not at all the problem of maintaining or increasing the number of men employed on each train, motor car or other unit of rail service. It is the problem of enabling the railways to reduce the cost of operating each unit of rail service—each steam train, each Diesel-powered train, each rail motor car—enough to make it practicable to render a passenger and freight service that will be both frequent and cheap enough to enable the railways to get their rightful share of the traffic by stopping the loss of it to other carriers and beginning to attract it back. An increase in traffic will increase gross earnings. Under present conditions nothing else will. An increase in gross earnings will make it practicable to increase the total compensation paid to employees by increasing the number of them. Nothing else will.

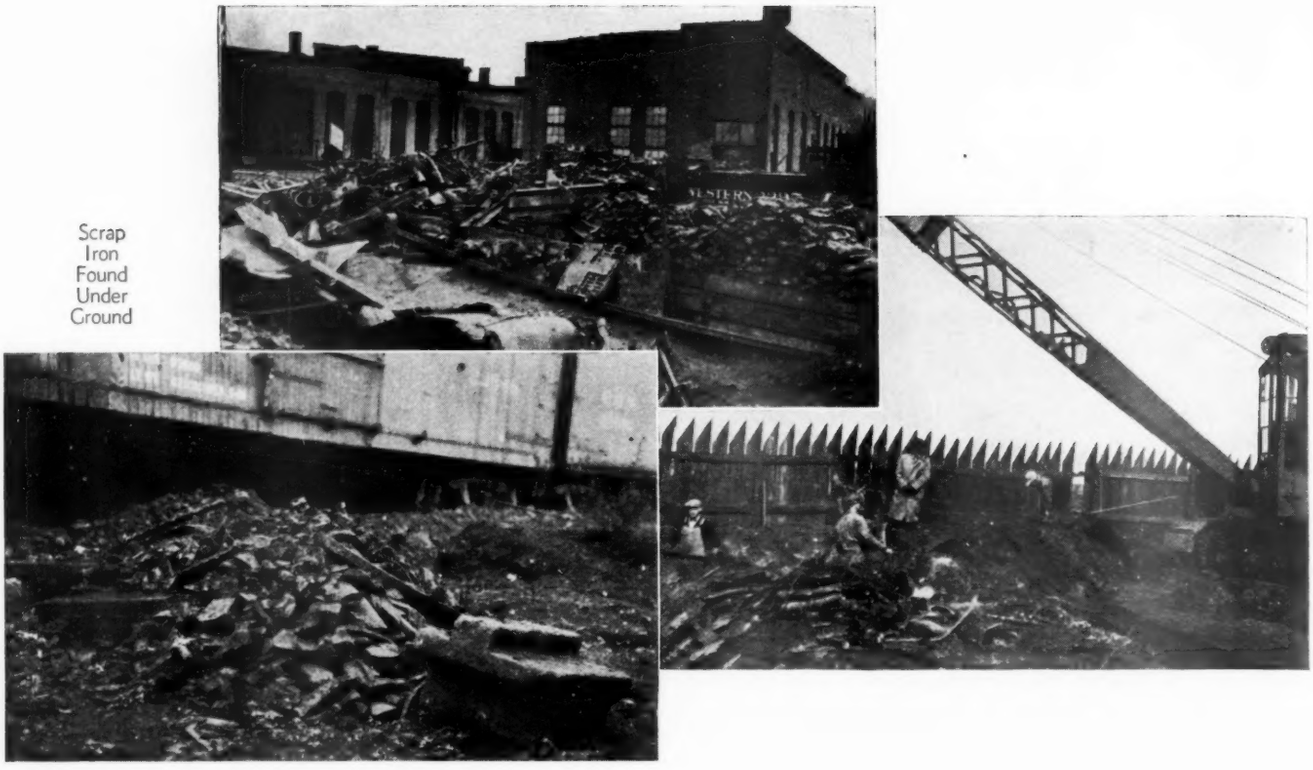
The elementary economics of the situation are slow in trickling through to those who do the thinking for organized railway labor. No doubt they will learn in time that their methods of trying to establish economic perpetual motion will not work. But it is a pity that so many capable railroad men have to be deprived of work and a great industry kept prostrate while knowledge is being so slowly acquired by those in authority in the labor unions.

The Plague of Interline Rate Division Disputes

The railroads serve as a model among industries for their ability to settle their differences with each other without resort to courts or commissions. In view of the complexity of inter-railroad relationships, the multitude of opportunities for misunderstanding which arise each day and the great reliance placed on verbal agreements, this absence of litigation is truly remarkable. In one respect, however,—divisions of interline freight rates—the contractual arrangements between railroads are not all that they might be. Inter-territorial disputes over these divisions now pending before the Interstate Commerce Commission were mentioned in these columns in our issue of November 16. Thanks to the efforts of the Joint Committee of Traffic Executives and Accounting Officers, no new disputes over divisions will arise. But there remain thousands and thousands of unsettled disputes which linger on, producing discord and involving endless correspondence and accounting expense.

Why are these disputes not settled? Since the industry has been able to agree upon a basis for preventing such disputes from arising in future, why can it not by the same approach put an end to existing controversies? Most of the disputes are the result of repudiation of agreed divisions, or by differences which arise in the interpretation of divisions. Where else in the railroad industry is it permitted to get out from under a contract whenever one feels so inclined, or to insist interminably on one's own particular interpretation of the contract with no higher authority able to dissolve the dispute?

Aside from the discord which these controversies keep alive in an industry which needs to present a united front to an outside enemy, these disagreements have a concrete practical side which cannot be ignored. In the disputes now pending before the Interstate Commerce Commission and informally by correspondence, millions of dollars of revenue are involved. Just how good is an unsecured claim for a substantial amount seven years old against a company in bankruptcy? How can a company reorganize its financial structure when a substantial proportion of its revenue account for the past six or seven years is a subject of litigation? These disputed divisions are not merely a departmental concern of the accounting and traffic departments. They are matters of first importance in financial and managerial policy, in which the integrity of great corporate interprises is involved.



Scrap Iron Found Under Ground

Chicago Great Western Improves Stores Handling

All departments cooperate to reduce waste—Write down inventories—Plow old dumps for hidden scraps

IN KEEPING with the necessities of the times and some matter-of-fact ideas on running a railroad, which were introduced by Patrick H. Joyce when he became a heavy investor in and president of the railroad after a career as a business and manufacturing executive, the Chicago Great Western has been giving its supply work a thorough overhauling. The results are more commanding because of the fact that, by the usual standards of comparison, this road has for years been able to show a stock balance well below the average.

General Store at Oelwein

The road extends from Chicago west 250 miles to Oelwein, Iowa, thence 250 miles north from Oelwein to Minneapolis, Minn., 250 miles west to Omaha, Neb., and 550 miles southwest to Kansas City, Mo., a total of 1,450 route miles, including branches. At Oelwein, where the shops are located, the company maintains a general store under a general storekeeper. It also keeps small stocks of locomotive and car materials in eight other terminals where material clerks of the car and locomotive departments are in charge. On each of the four operating divisions of the railroad are stocks of maintenance of way materials, consisting principally of ties and rail, which are maintained under the direction of the chief engineer.

Clean Up Road

Although the stock balance of all unapplied materials had been reduced from $1,613,000 at the close of 1927 to $1,220,000 at the close of 1929, the management launched an intensive clean-up program. At all points where material was stored, stocks in excess of a 30-day supply were shipped to Oelwein; the same was done with all materials found in shops, roundhouses, etc., which were not in use or about to be used on equipment undergoing repairs. At one time, 70 cars of materials were under load at Oelwein during the reorganization of the stock, including large quantities of special materials which had been ordered for coal docks, water works, signal and telephone work, motor cars, etc.; also carloads of miscellaneous materials scattered in shops and roundhouses.

These materials were identified and the usable stock returned to the shelves and platforms, while the surplus material was held for disposition and the obsolete material scrapped.

As a result of the study made in 1933, $44,856 of

store department stock, or 11.8 per cent of the total, was found to be obsolete, and $53,166, or 14.1 per cent, was surplus, the obsolete and surplus stock together amounting to $98,023, or 25 per cent of the total on hand. Notwithstanding the return to stock of some materials which had been charged out months before, the stock balance for the entire road was reduced from the upset figure of $1,220,000 on December 31, 1929, to $500,000 on January 31, 1934, or a total stock of $350 per mile of road, while the stock of storehouse materials was reduced from $875,995 in 1929 to $365,595 in 1934, representing a stock of only $250 per mile of line for general repair and maintenance.

Stop Storing Lumber

Indicative of what was found, enough bar iron was collected to permit such purchases to be discontinued for a year. In the lumber yard, bridge timber stock was reduced from $47,160 in 1930 to $19,862 in 1935, and the stock of car lumber was reduced from $77,100 in 1930 to $6,048 at present. By centralizing the lumber stock, utilizing the supplies on hand and buying lumber ready for use, the lumber yard has become little more than vacant ground with only a few lumber skids and plank runways to show how the ground had once been used.

In disposing of surplus material, the C. G. W. has experimented with the plan recently encouraged by the Purchases and Stores division of the Association of American Railroads of submitting lists to other railroads. The sale to both railroads and supply firms up to June, 1935, netted the company $6,700.

Reduce Varieties of Stock

The stock books, used only at Oelwein, were rewritten to make each volume less cumbersome and more useful. The new books carry an item number and can be used for taking the annual inventory. The items have been reduced from 17,241 on January 1, 1933, to 12,780 items in June, 1935, a reduction of 4,462 items, notwithstanding some additions required for new equipment. In each case where eliminations have been allowed, the items are marked obsolete in the books and the value is written down to the price of scrap. Care has also been taken to forestall the adoption of materials that would render materials in stock obsolete. Before any changes are now made, material which is to be superseded by materials of a different description or pattern is counted and arrangements are made to use the old materials before materials of the new standards are purchased.

More recently, the writing down of stock has been enlarged upon by decisions in several important cases that materials which are to become obsolete in the future (for example, triple valves) should be depreciated proportionately each year in the stock books so that when they will be declared obsolete, their value will have been reduced to scrap.

Cease Manufacturing

One of the first things of importance to the supply work that happened when a man long versed in railway manufacturing undertook to adjust the operation and expenditures of the railroad to the realities of the past five years was to put a stop to numerous manufacturing operations carried on in the shops of the railroads. The C. G. W., it was held, was not in the manufacturing business and, with instances available on every hand where materials could be purchased already fabricated for use almost, if not as cheaply from shippers as the raw material could be purchased, manufacturing and processing operations on the railroad shops beyond those absolutely required for repairing old materials were opposed. This action, together with the retiring of old equipment, eliminated the necessity for carrying many items of material in stock. With various machine tools relegated to scrap, the maintenance of stocks of repair parts for the machinery was also simplified and the way opened to make an effective raid on the road's variegated stock of patterns, and scores of patterns were reduced to kindling wood.

Find Scrap in Unexpected Places

The house cleaning was not confined to store-room shelves, to casting platforms, lumber yards and the shop floors, but extended to the collection and disposition of scrap iron. Here was a positive source of ready cash and, with information about the scrap-iron business which gave zest to the work, the management set out to get all the scrap the railroad could produce and handle it with "sure" profit. Not content with the visible supply of scrap in the last few years, it virtually went into the mining business, upwards of 500 tons of scrap iron being produced by exploring old dumps in the vicinity of the shops and roundhouses, where trailer wheels, couplers, knuckles, etc., were unearthed where they had been hidden under four feet or more of cinders for years. This scrap brought just as high a price on the market as scrap developed currently and the cost of recovering it with the aid of a yard crane was negligible.

Sorting is performed as the scrap is produced and the tonnage of each classification is reported monthly for record purposes and to permit the allocation of proper credit currently, but the scrap remains at the originating point until sold. The scrap at points outside of Oelwein is then loaded as called for on sale orders and the cars billed from one point to another until filled and ready for shipment to the market. Unnecessary rehandling at a central dock is "tabooed." When scrap is sold, which may be twice or three times a year, depending upon the price offered, a self-propelled crane equipped with a magnet is used for loading it.

Handle Scrap Cheap

During 1934, under this plan, 7,212 tons of scrap, produced by the stores department, the shops and the repair tracks at Oelwein, exclusive of wheels, were gathered and loaded at a cost of $564 for direct labor and crane expense, or an average cost of 7.82 cents per ton, and 7,819 tons of track and shop scrap produced on the divisions were handled for a total direct cost of $2,-

In the General Store at Oelwein

924, or 37.40 cents per ton, the total direct cost of handling the 15,031 tons sold in 1934 amounting to $3,488, or 23.21 cents per ton.

During 1933, four locomotives and 759 single-sheath box cars were dismantled. The locomotives produced 438 tons of ferrous scrap and 9,400 lb. of non-ferrous scrap without salvage, at a cost of $572 for direct labor and supervision and $482 for supplies, or $2.40 per ton. The cars produced 11,680 tons of non-ferrous scrap, 2,946 lb. of usable material and 80,396 lb. of ferrous scrap, at a cost of $7,761 for direct labor and $6,827 for supplies, or $1.30 per ton, including the cost of stripping and salvaging the lumber. The method of handling retirement equipment does not, however, conform to any fixed policies, but is dependent on the scrap market.

Turn Stock Monthly

With the mechanical stock and supplies for general use trimmed to the minimum and centralized, inventory is now taken continuously during the month so that every class of material is counted once a month and the stock is ordered on the basis of a 30 days' supply, except where minimum quantities or standard packages govern, as prescribed in the stock books.

All orders on the purchasing department for materials and supplies are drawn by the general storekeeper, using an 8½-in. by 11-in. form of two colors, a white form for materials carried in stock and a pink form for special materials. These forms are ruled to show the quantity of each item on hand, on order, and used during the previous 30 days, and also the unit cost, total cost and purpose. During the course of the month, as rapidly as stock is issued or received, as reported on requisitions or receiving records, the information is marked in the stock book and the orders for replenishment are prepared immediately after the inventory is taken and after the quantity to be ordered is marked in the stock book.

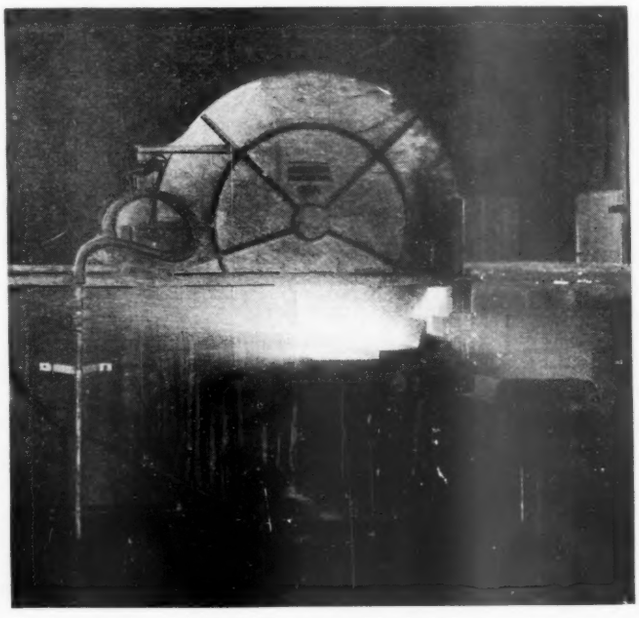
Materials are listed in the stock book by classes in accordance with the recommendations of the A.A.R. and are ordered by item number and description as they appear in the stock book without designating the class numbers. The storekeeper's copy of the order consists of two forms of double width, a white form for a loose-leaf binder in the office to show the invoice record, and a pink copy to check the materials as they are unloaded. Additional copies of orders are made as desired by inserting entirely blank forms between the original and the store copies when typing. Orders for stock-book materials or special materials require the approving signatures of the superintendent of motive power, the chief engineer or other officers, as the case may be, before being submitted to the purchasing agent, and in all cases the unit price of the material shown in the stock book, in the case of stock materials, or from other records for special material, are posted and extended on the original order blank to assist the approving officers in checking the requisitions.

The storekeeper receives a copy of each order placed on manufacturers by the purchasing department and, as the material is received (often before the invoice is received), the "tally record" is made on the pink copy of the storekeeper's order, the data then being transferred to the journal copy of the store department order so that when invoices are received they can be checked and approved for payment without delay. As rapidly as orders are filled, the journal copies are transferred to a closed file.

When requests for material are made by outlying stores or using department forces by telephone or wire (a circumstance which arises frequently under the practice of ordering stock on a 30-day basis) delays and confusion in supplying the material and preparing proper records are avoided by the practice in the general store of preparing the original and sending a copy to the maker of the unofficial order instead of waiting until confirming orders have been received.

Ship Section Supplies by Freight

Since most of the supplies are centralized at Oelwein, materials from manufacturers, for the most part, are received at Oelwein and are then shipped, as required, to points on the line, including stations and sections, by way freight, cars being loaded with the material properly tagged and in station order, and turned over to the yard office with way bills attached, to be unloaded where agents are located. The frequency of these car movements is determined by the tonnage available, as well as by standing schedules, and confusion is avoided by sending shipping notices to consignees in the first mail. This leaves only the distribution of oil to be handled by supply cars and provides a more flexible and expeditious service at less expense than could be provided by supply cars on this road.



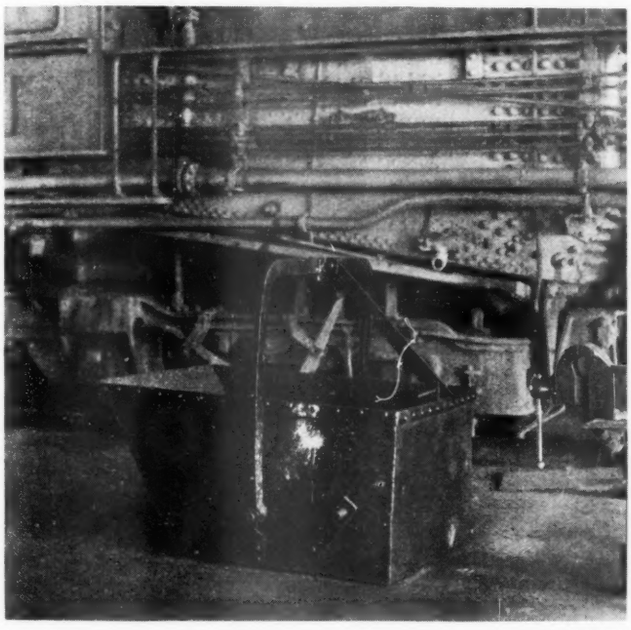
Rail Saw Reconditioning Rail

Until the car surplus vanishes, this road has discontinued unloading cars shipped to Oelwein with materials purchased in car lots, for example, spikes, cylinders of oxygen, etc., and instead fills orders directly from the cars, unless material is shipped in foreign cars or in grain cars. To prevent shipments of gas in foreign cars, the practice is to return empty cylinders in C.G.W. cars so that the shipment of loaded cylinders can be made in the same car. The effect of this practice in reducing handling costs is obvious.

Repair Old Materials

The store department at Oelwein operates a mill for resawing and redrilling rail. This plant has recently been resawing 85 lb. rail released from 18 miles of track. With the aid of a magnet crane for unloading and reloading the rail, the mill unloads, saws, redrills and loads 180 to 200 rails per day, and the sale price

of the cropped rail ends reimburses the railroad for the operation. In an adjacent shop equipped with an electric-welding outfit and a planer, old joint bars are reduced in section for re-use with smaller rail, and all brake beams are repaired. The cost of building up the surfaces of brake-beam heads is reduced by using small pieces of scrap steel for fillers. The drills in the rail mill are also used to perforate old superheater tubes for use as roadway drains, and a press has been improvised for straightening bent rail anchors. The work carried out by the stores at Oelwein also includes the reconditioning of frogs and crossings and track tools, all repairs to switch and marker lamps, and the inspection and repair of 1,000 or more charcoal heaters for freight cars. The output of the reclamation plant during 1934 included 215 switch points, 51 guard rails, 135 rigid frogs, 58 spring rail frogs, 1,652 85-lb. bars planed to 75 lb., 1,199 100-lb. bars planed to 90 lb., 14,435 rail anchors, 2,185 brake beams, 4,634 fence posts cut from flues, 2,417 brake-beam heads, and 1,125 resawed rails. The reclamation or maintenance of any materials which cannot be performed at the reclamation facilities of the



Self-Dumping Buckets Used for Collecting Scrap in the Shops at Oelwein

stores and all repairs to mechanical department materials, exclusive of brake beams, are performed in the car and locomotive shops. Recently this work included the resawing of 100,000 ft. of second-hand bridge timbers into 4-in. planks for use in repairing timber runways and platforms at Oelwein.

The store department receives each month from the accounting department a classified statement of the material on each division and on the railroad. The material on hand, used and purchased is reported by classes and by departments, in accordance with the form recommended by the A. A. R., and copies of these statements are furnished to the maintenance of way and mechanical departments to make "material conscious" those who use the material, as well as those who are expected to provide it.

Offices Co-ordinated

All stores and division accounting was centralized at Oelwein in 1931 and a further safeguard to orderly and economical procedure in the supply work has been obtained by the circumstance that offices and clerical forces of the general storekeeper, the superintendents of the shops and the car departments, and the accounting department, are all on the same floor at Oelwein, where consultation of all parties concerned in most matters can be had informally and on an instant's notice.

The stores operations, as described, are directed by S. M. Golden, assistant to the president, with E. R. Brinton, general storekeeper, in immediate charge.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended December 14 totaled 615,237 cars, a decrease of 21,896 cars as compared with the week before but an increase of 35,035 cars, or 6 per cent, as compared with the corresponding week of last year. Ore was the only commodity classification to show an increase as compared with the preceding week but coal, grain, and live stock showed decreases as compared with last year but miscellaneous freight showed an increase of 44,763 cars. The summary, as compiled by the Car Service Division of the Association of American Railroads, follows:

Revenue Freight Car Loading

For Week Ended Saturday, December 14

Districts	1935	1934	1933
Eastern	139,445	133,393	126,389
Allegheny	121,791	111,250	106,434
Pocahontas	43,335	40,615	38,315
Southern	90,515	88,066	84,021
Northwestern	72,638	68,411	65,077
Central Western	94,479	87,683	90,315
Southwestern	53,034	50,784	48,868
Total Western Districts	220,151	206,878	204,260
Total All Roads	615,237	580,202	559,419
Commodities			
Grain and Grain Products	29,247	30,373	29,956
Live Stock	14,124	18,341	17,493
Coal	132,180	148,903	127,448
Coke	8,056	7,267	7,694
Forest Products	27,469	20,790	20,367
Ore	5,921	3,089	3,431
Merchandise L.C.L.	156,439	154,401	159,713
Miscellaneous	241,801	197,038	193,317
December 14	615,237	580,202	559,419
December 7	637,133	551,485	541,992
November 30	570,427	488,185	499,596
November 23	646,503	561,942	585,738
November 16	628,330	585,034	602,708
Cumulative Total, 50 Weeks	30,452,159	29,872,078	28,233,823

Car Loading in Canada

Car loadings in Canada for the week ended December 14 totaled 42,931, or 436 less than last year and 1,990 cars less than for the previous week, according to the compilation of the Dominion Bureau of Statistics.

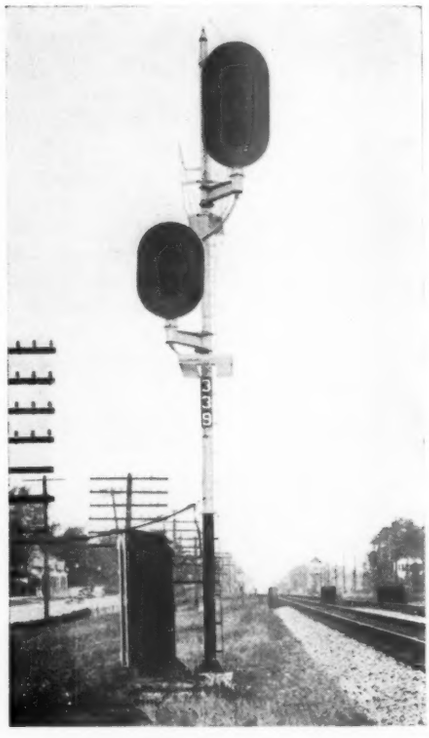
	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
December 14, 1935	42,931	24,173
December 7, 1935	44,921	22,152
November 30, 1935	46,815	21,508
December 15, 1934	43,367	21,644
Cumulative Totals for Canada:		
December 14, 1935	2,279,497	1,070,446
December 15, 1934	2,249,602	1,063,050
December 16, 1933	1,966,987	922,042

New Signaling on the Route of the C. & N. W. "400"

The New Ready to Replace the Old

High train speeds with heavy traffic require shorter blocks and multiple aspect

By S. E. Noble
Assistant Signal Engineer,
Chicago & North Western



Four-Indication Location Using Type-D Color-Light Signals

THE adoption of faster train schedules and the recent advent of the "400" caused the Chicago & North Western to give special consideration to the signaling between Wilmette, Ill., and St. Francis, Wis., a distance of 65 miles, and between Milwaukee, Wis., and Folsom Place, a distance of 3.5 miles, on its line between Chicago and St. Paul via Milwaukee. These territories were equipped with Hall disk signals and, except for a few sections with home and distant signals, the overlap system was used. The necessarily long overlaps and the poor range of vision afforded by the disk signals, together with the fact that they were oil lighted and approximately 30 years old, made the system far from desirable for the operation of trains on high-speed schedules.

Cost Reduced by Eliminating Signal Bridges

It was readily agreed that the most desirable type of signal for this territory was either the color-light or the searchlight type, the searchlight type being considered preferable on account of the fogs which occur at various times during the year along Lake Michigan.

On double-track lines the C. & N. W. operates left-handed, and previous estimates had been based on the use of a signal bridge at each location in order to mount the signal over the track which it governed. This was thought necessary to give the enginemen a good view of the signal, since it was not practicable to place the signal on the ground between main tracks. An analysis of previous estimates showed that these bridges were responsible for approximately one-third of the estimated cost, an item of expense worthy of further investigation.

The majority of the existing Hall disk signals were mounted on masts to the left of the track and had been so located since they were installed. Low-hanging fogs caused enginemen to favor signals located at the proper height at the left of the track, rather than on bridges. These facts caused the signal department to make tests to determine the height of a searchlight-type signal which, placed on a mast to the left of the track, would provide the best vision from the right-hand side of the locomotive cab. It was found that with the motive power in use, a height of 16 ft. from the top of the rail to the center of the lenses was most satisfactory to the enginemen. At this height, the engineman retains a view of the signal until he is within approximately 60 ft. while the fireman, of course, has a view the full distance. This was considered satisfactory enough to warrant installation without the use of bridges, making it possible to reduce the previous estimate of $300,000 to $200,000. The desirability of a new signal system in this territory, and the substantial reduction in the cost of the proposed installation, caused the management to accept this estimate, and to authorize the installation on the basis of an expenditure of approximately $13,000 each month until completed.

Further economies in installation have since been accomplished. For instance, power has been taken from existing service connections at stations and at highway crossing signal installations, and is carried on the line at 110-120 volts to feed two or three signal locations on each side of the connection. This resulted in the elimination of sections of power line, line transformers, plug cutouts, etc., and kept the wattage and voltage of the power circuits within suitable limits to eliminate the necessity of providing greater spacing between cross-arms, which would have required the installation of

higher poles in a large portion of the line. Existing track cuts, signal masts, relays, relay boxes, etc., have been used so far as practicable in order further to reduce the cost.

A close study of the territory and train operation has shown that in certain sections, regardless of the stopping distance required for high-speed trains, blocks could be extended still further and a number of signals eliminated. It now appears that all of these various items will result in a further reduction of approximately $50,000. The matter of financial authority having been settled, the next most important problem was to determine definitely the signal spacing and location of the signals.

Problem of Spacing Signals

The suburban district extends north to Waukegan, Ill., 36 miles from Chicago. In addition to Waukegan, suburban trains originate and terminate at Highland Park, Ill., and at Winnetka, 23 miles and 16.5 miles, respectively, north of Chicago, and within the district to be resignaled. At Wilmette, the south end of the installation, the double track merges into three tracks leading toward Chicago. The section of the track and signal layout, which is reproduced as one of the illustrations, shows that the suburban stations are numerous and closely spaced between Highland Park and Wilmette.

During the suburban rush period in the morning, there is a mixture of local and express suburban trains, together with several through trains from points north. It can readily be seen that with suburban trains starting out of Waukegan, Highland Park and Winnetka, traffic becomes more congested as it approaches Wilmette. The headway scheduled between some of these trains is only three minutes. Therefore, the problem was to provide signaling which would give protection for the local station stops, and also give smooth operation, as well as provide for high-speed operation of such trains as the "400" through the same territory at a speed of 80 to 95 m.p.h., outside of the suburban rush period.

Calculated stopping distances and tests indicated that for these speeds, signals of a three-aspect, two-block system would have to be spaced 7,000 to 8,000 ft. apart, if it were desired to stop a train without making an emergency application. The old overlap system that was previously in use caused innumerable stops during the rush hours on account of the length of the overlap. Although a three-aspect two-block system would probably eliminate some of the stops, it would still cause considerable delay due to C. & N. W. Rule 501B for an approach signal requiring a train exceeding 30 m.p.h., to at once reduce to that speed. Spacing of 7,000 to 8,000 ft. would cause more than one suburban station to fall within a block, and the benefit of a nearby signal in protecting a station stop would be lost.

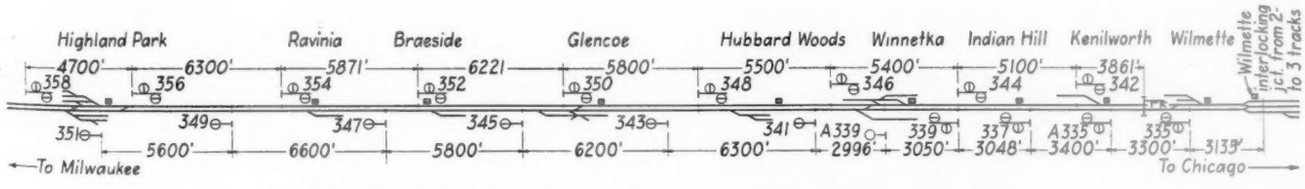
Four-Indication Three-Black Signaling

The solution was to provide short blocks with four-indication three-block signaling, for the congested section. This has proved to be very satisfactory since it has been placed in service. This type of signaling extends on the eastward track from a point three miles north of Highland Park to Wilmette, and on the westward track from Wilmette to Winnetka. It was found that there is not as much congestion of traffic on the westward track during the evening rush periods as on the eastward track during the morning rush hour. Although the evening trains come from two tracks on to one, they space themselves farther apart sooner, and there are few through trains to contend with during the rush hour. Through trains such as the "400" and the Pacemaker do not travel as fast going westward through this territory as they do going eastward, partly on account of the grade and partly owing to the fact that westbound they are just leaving territory with speed restrictions. For these reasons the four-indication, three-block signaling does not extend as far on the westward track as on the eastward.

Searchlight Signal Location on Three-Aspect Territory

Three-Indication Two-Block Signaling

The maximum speed attained by the fastest train between Highland Park and Milwaukee is approximately 95 m.p.h. On account of grades and speed restrictions, this maximum speed is attained at only two or three points on the entire section, and these points are on a descending grade terminating in an ascending grade. Our analysis indicated that the maximum stopping distance required is well within 8,000 ft. Therefore, no need was found for other than three-indication two-block signaling in the Highland Park-Milwaukee



Track and Signal Plan of Four-Aspect Territory Between Highland Park and Wilmette

district, except for two blocks going down grade into Waukegan. Consideration was given to possible maximum speeds, grades and train spacing, and the signals were spaced 6,000 to 10,000 ft. apart, depending on conditions. As far as practicable signals were located to give the enginemen the maximum length of view.

Types of Signals and Aspects

A two-arm color-light or two-arm searchlight signal is used to provide the four-indications for the three-block signaling. The two arms are staggered, the top arm to the right of the pole and the bottom one to the left. Where G. R. S. Type-D color-light signals are used, the height of the bottom lens of the lower arm is 16 ft. from the top of the rail, and the bottom lens of the top arm is 5 ft. from the bottom lens of the lower arm. Where searchlight Type-SA signals are used, the distance is 16 ft. from the top of the rail to the center of the lower arm lens and 5 ft. between the center of the lower arm lens and the center of the top arm.

The aspects and indications given for an occupied block in the four-indication three-block districts are as follows: The signal at the entrance to the occupied block presents an aspect of red diagonally above red. Name—"Stop and Proceed" signal; indication—Stop—then proceed in accordance with Rule 509, a or b. This being double-track territory 509 b applies. When a train is stopped by a "Stop and Proceed" signal it may proceed a . . . b on two or more tracks at once at restricted speed.

The first signal approaching the "Stop and Proceed" signal presents an aspect of yellow diagonally above red. Name—"Approach" signal; indication—Prepare to stop at next signal. Train exceeding 30 m.p.h. must at once reduce to that speed. The second signal approaching the "Stop and Proceed" signal presents an aspect of yellow diagonally above green. Name—"Approach Medium"; indication—approach next signal at not exceeding medium speed. Train exceeding 40 m.p.h. must reduce to that speed. A clear signal in this district will present an aspect of green diagonally above red.

One-arm Type-SA searchlight signals are used in the three-indication automatic two-block territory. The indications given are red, yellow and green for "Stop and Proceed." "Approach" and "Clear" signals, respectively, and the rules are the same as for the two-arm signals of the same name.

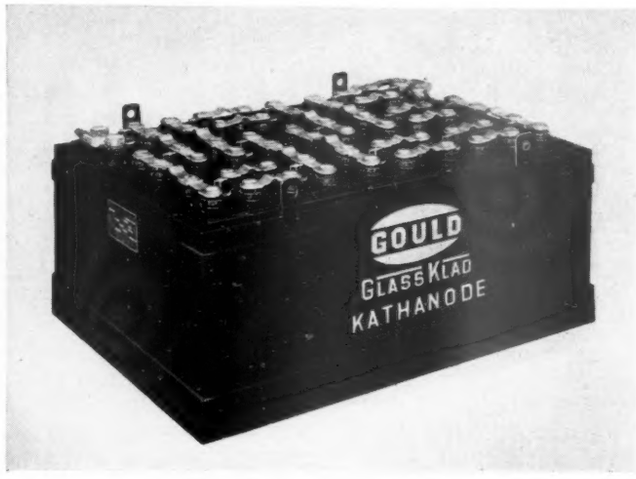
Signal material used in connection with this installation such as signals, relays, rectifiers and relay boxes, etc., was purchased from the General Railway Signal Company. Okonite rubber-covered copper wire is used for hand-made cables, track and box wiring. Other accessories were furnished by the Western Railroad Supply Company.

The installation is being made by Chicago & North Western division construction forces under the direct supervision of the assistant signal engineer, assisted by C. W. Biggers, general foreman, and E. F. Shaw and K. Chamberlain, signal inspectors. The installation is now approximately 70 per cent completed, and it is expected that it will be entirely completed by March 1, 1936.

ACTIVITIES IN THE CHICAGO UNION STATION mail department during the Christmas rush were a part of the "magic key" radio program of the Radio Corporation of America on a coast-to-coast hook-up on December 22. During seven minutes of the one-hour program the announcer described briefly how mail is handled in the Union station's mail separating platform and what goes on at the doors of the railroad cars.

Motive Power Storage Battery

AN improved type of battery, for use on locomotives, industrial trucks, highway trucks, etc., is now being offered by the Gould Storage Battery Corporation, Depew, N. Y. Known as type KMD, it is similar in form to the RVPX unit which it displaces, in that highly-porous, laminated mats of spun glass are held against both sides of the positive plates to prevent loss of active material. These mats are now held in intimate contact with the plates by perforated, hard-rubber envelopes which are formed over plates and mats. The porosity of the rubber has been increased by a new arrangement of perforations. The ribbed

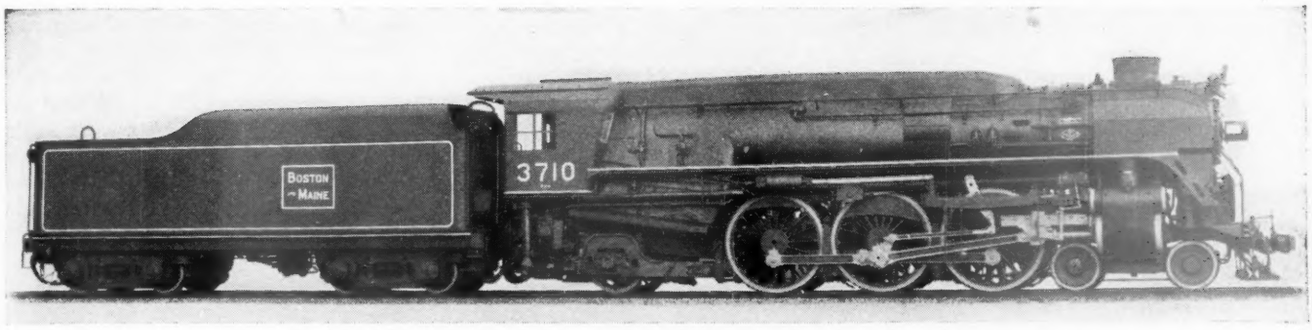


wood separators, formerly used between positive and negative plates, have been replaced with Durapor separators. Durapor is a combination of silica gel with finely divided particles of rubber which is porous. It prevents bridging from positive to negative plates, but does not inhibit chemical action.

The Kathanode type of construction has been found effective in reducing loss of active material, and the sediment space has been reduced from 1¾ to 1¼ in., thus dropping the elements in the cell and providing for more electrolyte space at the top and better insulation. Other improvements include large vent plugs, having built-in baffles to prevent spraying of electrolyte, and refinements in tray structure, to meet the requirements of motive power service.

THE MOST SERIOUS THREAT to American railroads today is the attitude of legislative bodies, E. E. Loomis, president of the Lehigh Valley, said in a statement issued on December 27. Mr. Loomis cited in this connection the expenditures on waterways and the "make-work" bills now before Congress, pointing out that if the latter were enacted the adverse effect would be such as to more than offset any advantage which the rail carriers would receive from the regulation of their highway competitors.

Continuing, Mr. Loomis declared that if the railroads were given a fair chance they could assume leadership in the revival of business. Thus, he added, the seriousness of the situation makes it imperative "that all thoughtful persons, not only investors and shipping and traveling patrons, but every taxpayer give the subject more than passing attention."



Class P-4-a Pacific Type Locomotive Built by the Lima Locomotive Works for the Boston & Maine

B. & M. Tests New Pacific Type Locomotives

Proper loading and suitable train schedules essential for realization of anticipated economies from improved designs

LAST winter the Boston & Maine received five 4-6-2 type locomotives from the Lima Locomotive Works, Inc., which were numbered 3710 to 3714, inclusive, and are known on the road as Class P-4a. A description of these locomotives was given in the *Railway Age,* December 29, 1934, page 851. As will be noted from Table I of dimensions and weights these locomotives are unusually heavy and powerful for one of the 4-6-2 type, have high steam pressure and superheat, large drivers and generous boiler capacity. They are consequently well suited for operation at high speeds and with heavy train loads.

Drafting Tests

In order to determine the economy of the locomotives in passenger service with light and heavy trains, the road obtained the use of the dynamometer car owned by the Westinghouse Air Brake Company and conducted a carefully planned series of road tests.

Preliminary tests were first made with a Class P-4a locomotive, No. 3711, to determine whether it was suitably drafted. The smokebox arrangement in these locomotives follows the usual lines of the so-called Master Mechanic's front end with diaphragm, table plate and a perforated plate screen instead of netting. The tapered stack is 20 in. in diameter at the choke and has an inside stack extension flaring out to a 36-in. bell at the bottom which is 15 in. above the exhaust nozzle. The nozzle is a modified Sweney, or so-called annular type, developed on the B. & M. and adopted as a standard. It has six segmental ports 12 in. across the outside diameter and a closed center 3½ in. across. The full open area is 48.07 sq. in. Desired reductions in area or choking are obtained by means of a circular central plate held in place by a ¾-in. stud and nuts. The locomotive, when received, was fitted with a 6½-in. diameter choke plate which gave an exhaust opening of 36.84 sq. in. During the preliminary drafting tests the opening was increased by varying degrees to 7 per cent over the original area; i.e., to 39.24 sq. in. obtained by a *cho*ke plate 6 in. in diameter. This modification effected a saving in coal of approximately 8 per cent for an equal amount of work performed.

Heavy Passenger Service Tests

After completion of the drafting tests runs were made between Boston, Mass., and White River Junction, Vt., on passenger trains No. 325 westbound and No. 302 eastbound with 13 cars. The length of these runs is 142.9 miles. A general summary of the results obtained is given in Table II.

Table I—Important Dimensions, Weights and Capacities of the Boston & Maine 4-6-2 Type Locomotives, Class P-4a

Type	4-6-2
Class	P-4a
Builder	Lima
Date	1934
Road numbers	3710–3714
Weight of engine	339,200 lb.
Weight on drivers	209,500 lb.
Weight of tender (loaded)	240,000 lb.
Total weight, engine and tender	579,200 lb.
Rated tractive force, main engine	40,900 lb.
Rated tractive force, booster	11,900 lb.
Cylinder horsepower (Cole)	2,475
Boiler horsepower (Cook)	2,913
Estimated evaporation (Cook)	54,063 lb. per hr.
Cylinders	25 in. by 28 in.
Drivers, diameter	80 in.
Boiler pressure	260 lb.
Heating surfaces, sq. ft.:	
Firebox	320
Tubes and flues	3,528
Evaporative	3,848
Superheating	966
Comb. evap. and superheat	4,814
Length over tube sheets	20 ft.
Grate area	66.9 sq. ft.
Superheater, type	A
Feedwater heater	Coffin
Stoker	Std. HT

NOTE:—Estimated evaporation includes allowance for feedwater heater.

These tests were conducted in midwinter when the weather conditions were unfavorable and, as a consequence, the low temperature increased the resistance of the locomotive and train. On the westbound run the recorded temperatures averaged 9.1 deg. F. and on the eastbound run 13.04 deg. F.

Referring again to Table II it should be noted that

the prevailing grades make the westbound trip much more difficult than the eastbound trip. As a consequence, the average horsepower was much lower eastbound. The coal consumption per drawbar-horsepower, or per 1,000 g.t.m., was also lower, while the water rate per unit of work was 14 per cent greater. The maximum sustained drawbar horsepower on a two-mile stretch was only 1,990 hp., which was considerably less than the full capacity of the locomotive. Trains heavier than 13 cars could have been handled easily.

Table II—Tests of Class P-4a 4-6-2 Type Locomotive No. 3711 between Boston and White River Junction—Heavy Passenger Service

	Train No. 325, westbound	Train No. 302, eastbound
Number of cars	13	13
Tons, train	859.4	904.84
Gross ton-miles	122,700	129,150
Average running speed, m.p.h.	42.6	42.8
Average drawbar-horsepower	1,346	995
Maximum sustained db. hp., 2 miles	1,990	1,825
Water from tender per db. hp.-hr., lb.	25.5	29.1
Water, includ. condensate, per db. hp.-hr., lb.	28.1	32.0
Water from tender per lb. coal, lb.	6.84	8.04
Water, includ. condensate, per lb. coal, lb.	7.53	8.84
Firing rate, sq. ft. grate per hr., lb.	75.1	54.0
Coal per db. hp.-hr., lb.	3.73	3.62
Coal per 1,000 g.t.m. (train), lb.	137.0	93.0

Tests in Light Passenger and in Freight Service

The next two tests were made on light passenger-train runs handling only six or seven cars between Boston, Mass., and Portland, Me., and return, a one-way distance of 114.7 miles. In this territory the grades are comparatively light. A third run, from Portland to Boston, was made with a train of 12 cars. The results of these tests are given in Table III.

Comparing the last two tests where there was a considerable variation in the weights of the two trains the following differences are noted: The average drawbar horsepower was increased from 976 to 1,405, an increase of 44 per cent, while the firing rate rose from 58.0 to 71.4 lb. of coal per square foot of grate per hour, an increase of 24 per cent. The evaporation, including condensate, was 8.82 lb., of water per pound of coal for the heavier train against 7.94 lb. for the lighter train, an improvement of 11 per cent. On a drawbar horsepower basis the coal consumption was 3.39 lb. for the heavier train in comparison with 3.97 lb. for the lighter train, an improvement of 15 per cent. On a 1,000 g.t.m. basis the improvement in the coal rate was 31 per cent.

Table III—Tests of Class P-4a 4-6-2 Type Locomotive No. 3711 between Boston and Portland—Light Passenger Service

	Train No. 121 northbound	Train No. 130 southbound	
No. of cars and tons, train	7—460.3	6—385.7	12—736
Gross ton-miles	52,800	45,450	84,500
Average running speed, m.p.h.	49.74	45.3	43.3
Average drawbar horsepower	1,060	976	1,405
Maximum sustained db. hp., 2 miles	1,710	1,774	1,955
Water from tender per db. hp.-hr., lb.	27.0	28.6	27.2
Water, includ. condensate, per db.hp.-hr., lb.	29.8	31.5	29.9
Water from tender per lb. coal, lb.	7.90	7.23	8.02
Water, includ. condensate, per lb. coal, lb.	8.69	7.94	8.82
Firing rate, sq. ft. grate per hr., lb.	54.5	58.9	71.4
Coal per db. hp.-hr., lb.	3.43	3.97	3.39
Coal per 1,000 g.t.m. (train), lb.	159	215.7	149

Before completing the tests with the Class P-4a Pacific type locomotive runs were made between Boston and Portland in fast freight service. On the southbound run the train tonnage was 2,757 in 69 cars and, northbound, 2,769 tons in 89 cars. The results of these tests are given in Table IV. A maximum sustained drawbar horsepower of 2,840 was obtained. This is well up to the estimated capacity of the locomotive. Comparing these fast freight runs where the locomotive was well loaded with the previous passenger-train runs where the locomotive was lightly loaded, it will be noted that the water and coal rates per drawbar horsepower were much higher in the passenger-car runs. Some of this difference, but probably only a small portion, was due to differences in speeds. Averaging the results of the two fast freight tests and the five passenger-train tests we obtain a coal rate of 3,065 lb. per drawbar horsepower for the former and 3.628 lb. for the latter, an increase of 18 per cent. For the water rate per drawbar horsepower the averages are 24.45 lb. for the freight- and 30.26 lb. for the passenger-train tests, an increase of nearly 24 per cent.

Conclusions From the Tests

Passing over the preliminary tests which showed that an increased economy could be obtained by increasing the opening of the exhaust nozzle, it was clearly demonstrated that the efficiency of the locomotive was largely dependent upon its being used in a service where it could be loaded to somewhere near its capacity. An increase from six or seven passenger cars to 12 or 13 cars provided by no means a full load. With 15 cars the results would undoubtedly have shown an even higher efficiency. In fast-freight service where an adequate load was obtained the coal and water rates were considerably improved.

Table IV—Tests of Class P-4a 4-6-2 Type Locomotive No. 3711 between Boston and Portland—Fast Freight Service

	Train No. B12 southbound	Train No. B11 northbound
Number of cars	69	89
Tons, train	2,757	2,769
Gross ton-miles	296,100	306,800
Average running speed, m.p.h.	29	27.7
Average drawbar-horsepower	1,565	1,591
Maximum sustained db. hp., 2 miles	2,632	2,840
Water from tender per db. hp.-hr., lb.	22.1	22.4
Water, includ. condensate per db. hp-hr., lb.	24.3	24.6
Water from tender per lb. coal, lb.	7.36	7.18
Water, includ. condensate, per lb. coal, lb.	8.08	7.90
Firing rate, sq. ft. grate per hr., lb.	70.6	74.3
Coal per db. hp.-hr., lb.	3.01	3.12
Coal per 1,000 g.t.m. (train), lb.	58.1	64.7

* * *

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Ohio Flood Control Project Requires Extensive Railroad Relocations*

Construction of dams in the Muskingum Watershed Conservancy District necessitates reconstruction of 52 miles of main line tracks of four railroads

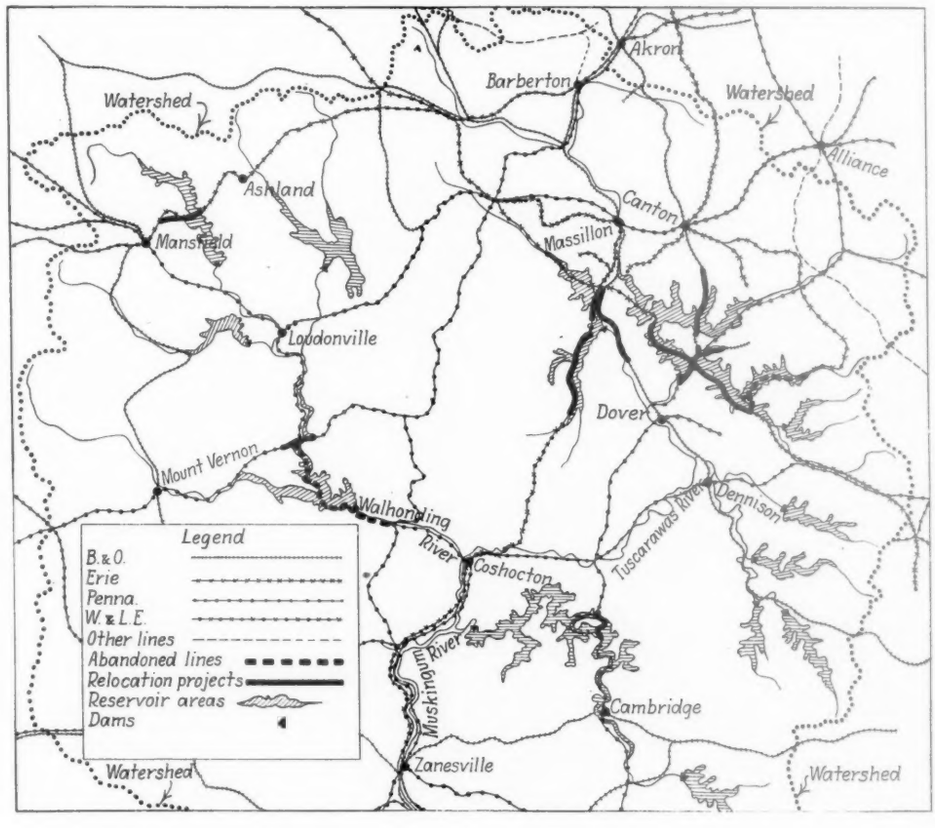
By G. H. Friend

Senior Engineer and Chief of the Railroad Section, U. S. Engineer Office, Zanesville, Ohio

FIFTY-TWO miles of line on four railways in Southeastern Ohio are being relocated in order to raise the grade lines above the water level behind a series of dams that are under construction in the Muskingum Watershed Conservancy District. This conservancy district was formed in 1933 for the purpose of formulating and executing a flood-control and water-conservation program in the drainage basin of the Muskingum river, a tributary of the Ohio river, which comprises a total area of more than 8,000 square miles. The plan, as subsequently evolved by the conservancy district in cooperation with United States engineers, calls for the construction of 14 regulatory and storage dams across tributaries of the Muskingum river at a total estimated cost of $34,500,000, a large portion of which was provided by a grant from the Public Works Administration. Work on the construction of the dams as well as on the relocation of railroads, highways and public utility facilities necessitated by the impounding of water in the reservoirs is now actively under way.

Early in the history of the Middle West the easy gradients of the Muskingum river and its tributaries attracted the development of lines of transportation between the Ohio river and the Great Lakes. In the period from 1825 to 1850, this development took the form of canal building in the valleys of the Muskingum, the Walhonding and the Tuscarawas rivers, and at one time these canals handled a large volume of traffic. However, with the completion of the Baltimore & Ohio as far west as Wheeling, W. Va., in 1853, an era of railroad construction was inaugurated in this vicinity. In addition to the favorable grades offered by the valleys in the Muskingum watershed, which attracted the construction of railroad lines for handling through traffic, the development of the extensive natural resources possessed by the territory, chiefly coal and ceramic clays, required the construction of many branch and feeder lines. As a result the watershed is covered with a network of railroads, which comprise main lines and branches of the

* This article is based on a paper which was presented by Mr. Friend before a recent meeting of the Cleveland section of the American Society of Civil Engineers, at Zanesville, Ohio, to which has been added considerable supplementary information.



Map of the Muskingum River Watershed Showing the Various Reservoirs and Railroad Relocation Projects

Pennsylvania, the Baltimore & Ohio, the Erie and the Wheeling & Lake Erie. By 1860 it had become evident that the days of usefulness of the canals were numbered and today only traces of them remain.

Preliminary Studies

In view of the large number of railroad lines in the watershed that had to be reckoned with, the expense of relocating them had an important bearing on the selection of sites for the dams and reservoirs to be constructed by the Muskingum Conservancy District. Studies for railroad relocations were begun on May 1, 1934, and were continued until August 1 of that year before surveying parties were placed in the field to run preliminary lines and establish final locations. During that period 151 dam and reservoir locations were studied and in some instances studies were made for four or five different spillway elevations for the same dam. In every instance, the Railroad section of the Corps of Engineers was required to answer promptly the questions: "What railroad lines, if any, will be affected?" and "What will it cost to relocate them?" As a result it was necessary to prepare estimates on more than 280 miles of railroad relocations.

Railroad Relocation Projects—Muskingum Watershed Conservancy District

Railroad	Line Affected	Length of Relocated Line (Miles)	Reservoir
Baltimore & Ohio	Wheeling to Warwick....	5.25	Beach City
" " "	Cleveland to Valley Jct...	5.85	Bolivar
" " "	" " " " ..	2.2	Dover
Erie	Main line to Chicago.....	2.65	Charles Mill
Pennsylvania	Marietta branch	....	Bolivar
"	" "	5.62	Dover
"	" "	3.37	Wills Creek
"	Cleveland-Columbus	1.85	Mohawk
Wheeling & Lake Erie	Brewster to Zanesville...	9.33	Beach City
" " " "	Brewster to Sherrodsville..	14.60	Dover

It was imperative that the estimates be reasonably correct, for within the period of 90 days the U. S. District Engineer was required to decide what dams and reservoirs could be constructed with the $22,090,000 appropriated by the Federal Government that would afford the maximum amount of flood protection. Once this decision was reached, it was too late to make material revisions in the estimates of cost.

As there was not sufficient time available in which to run preliminary lines, United States Geological Survey topographic maps were photostated and enlarged and used as a basis for estimating the cost of the railroad relocations. Upon these enlarged prints, suggested grade lines were outlined and the alinement of tangents and curves was projected to fit the grade lines as closely as possible. Using elevations obtained from the contour lines, profiles were drawn from which grading quantities were estimated. This information was augmented by data obtained by hurried reconnaissances made by automobile. The estimates thus prepared remained unchanged and the budget of expenditures was based upon them until bids for construction were received.

Fifty-two Miles Relocated

The official plan, as finally adopted, requires the relocation of 52.17 miles of main tracks and 16.64 miles of sidings, or a total of 68.81 track miles. A total of 12.91 miles of trackage will be relocated for the Pennsylvania, 17.2 miles for the Baltimore & Ohio, 5.4 miles for the Erie and 33.3 miles for the Wheeling & Lake Erie. The largest single project is that involving the Wheeling & Lake Erie at the Dover reservoir, which will require 1,200,000 cu. yd. of grading and will cost $1,650,000. A list of the relocation projects is given in the accompanying tabulation.

Contracts Awarded to Date

The work is being performed under contract, except the raising, realinement or cutting in of existing operated tracks, which work is to be carried out by railroad forces at a cost to the Federal Government previously agreed upon. To date nine contracts have been awarded for railroad relocations, three involving lines of the Pennsylvania, three of the Baltimore & Ohio, two of the Wheeling & Lake Erie, and one of the Erie. The contracts generally include all construction work, with the exception of the fabrication and erection of the major steel bridges, which work was awarded under a separate control. The contracts awarded to date for railroad relocations involve an expenditure of $4,427,000, while the total estimated cost of all the relocations involved is approximately $6,000,000.

In two instances, it was determined that the lines of railroad involved had practically served their terms of usefulness, that their operation was no longer profitable to the owners and that they no longer contributed materially to the public convenience. In these instances, therefore, agreements have been entered into with the owning companies with a view to securing authority from the Interstate Commerce Commission for the abandonment of the lines. In another instance where two companies have parallel lines carrying a combined traffic that can readily be handled over one line, arrangements are being made to relocate only one line which will be jointly owned and operated by the two companies.

The Muskingum river drainage basin comprises heavy rolling country with differences in elevation of over 200 ft. in distances of one-half mile. The material encountered embraces everything from shales, sandstones and limestones of the carboniferous period to deposits of glacial sands and gravels in the bottoms of the valleys. In general, the materials encountered in cuts are of a character that will produce stable embankments.

The Conservancy Act of the State of Ohio provides that in the relocation of railroads, the ruling grades on the operating division affected must not be exceeded on the relocated line. In the Muskingum watershed this requirement has been fulfilled without difficulty. Moreover, it has been the aim not to increase distances and curvature when laying out the relocations. In one or two instances, however, this was not possible, owing to physical considerations, but in most cases distances and total degrees of curvature have been decreased rather than increased.

At the Wills Creek reservoir, where the existing line of the Pennsylvania follows a loop in the course of the stream, the construction of a tunnel through the ridge between the two legs of the loop will make it possible to effect a decrease of five miles in distance and a reduction of 260 deg. of curvature. The maximum grades on this relocation are 0.9 per cent (compensated) opposing loaded movements and 1.0 per cent opposing the direction of the empty movement. These grades are the heaviest introduced in any of the relocations, but are appreciably less than those encountered elsewhere on the particular line involved. In another case where the original line had a maximum curvature of 8 deg., the relocated line has only one curve of as much as 6 deg. The maximum raise in grade above the old lines was 35 ft., except at the Wills Creek relocation of the Penn-

sylvania, where a greater rise was involved in crossing the ridge mentioned above.

In general, the quantities in cuts and fills were balanced, but on one of the Wheeling & Lake Erie relocations, where the cuts were largely in rock, it proved cheaper to raise the grade so as to reduce the cut excavation and make up the deficiency in embankment from borrow pits. The maximum depth of the cuts on the various projects is about 80 ft., while the maximum height of fill is about 50 ft. The standard width of roadbed adopted by the relocation projects is 20 ft. on embankments and 26 ft. in cuts, except on a minor branch of the Baltimore & Ohio where the embankments are being made 16 ft. wide and the cuts 22 ft.

Co-operative Spirit of Railroads

It is fitting to remark upon the co-operative spirit in which the railroad companies have joined in this undertaking. Without exception, their officers have freely furnished all data and information that have been requested of them and have joined in the negotiations covering the conduct of the work in a most cordial manner. In relocating the lines, the policy is to construct them to a standard of quality at least equal to that of the existing lines and, in the matter of track construction, the standards of each railroad are adhered to in every respect. In the matter of bridge and masonry design, however, in the interests of economy, an effort has been made to achieve uniformity throughout the entire project. The larger drainage openings are of the reinforced concrete box type, while bridge abutments are of the open-frame type. With one exception, deck plate-girder spans having a maximum length of 125 ft., which are designed for Cooper's E-60 loading, have been adopted for major bridges.

Every railroad bridge engineer has individual ideas concerning the design of bridges and it has been found that certain features of design that the bridge engineer of one railroad desires may be objectionable to the bridge engineer of another railroad. However, the bridge engineers have been lenient with us; one has yielded a point here, and another a point there, until reasonable uniformity of design has been achieved.

Standardization of Track Materials

A similar problem has been encountered in connection with attempts to standardize on track materials. While the American Railway Engineering Association has adopted standards for the design of certain railroad materials and appliances, it has been interesting to note that, in regard to such a simple appliance as a track spike, each of the four railroads whose lines are being relocated has its standard design which differs in some slight detail from the others. In addition, each of the four railroads uses a different arrangement and number of spikes for fastening the rails to the ties. One railroad uses four one-inch bolts for each rail joint, another uses six. Such differences of practices and standards exist throughout a long list of materials and appliances that must be used in the construction of the railroad relocations.

The customary practice among railroad companies when a new line is to be constructed is to furnish the bidders with a profile of the new location and a general specification covering materials and workmanship. Details of the design of bridges, buildings and other structures are worked out after the contract is awarded. However, where the work is to be performed under a government contract this practice cannot be followed. The contract drawings and specifications for each contract must be complete to the most minute detail. Bridge masonry and superstructures, station and roadway buildings, water supply facilities, and track fastenings and appliances must be completely detailed and specified in order to enable the contractors to figure the exact amount and kind of materials and appliances that will be required for the completion of the work. On the relocations involved in this project, the practice has been to submit the plans and specifications to the railroads for review and approval before the work is advertised for bids.

Embankments Compacted

At the beginning of the negotiations, the railroad companies were inclined to stress claims for "extraordinary maintenance," which were based on the increased cost of maintaining newly-constructed roadbeds. However, this difficulty has been largely removed by requiring that the embankments shall be constructed in one-foot layers and each layer thoroughly compacted by rolling with an approved type of power-driven roller. The specifications provide that if satisfactory compaction is obtained by the operation of tractor haulage and spreading equipment, the use of the roller may be dispensed with. Tractors and tractor wagons are being generally used for haulage, while bulldozers mounted on tractors are employed for spreading material. Excellent compaction is being thereby generally obtained without the use of special rollers.

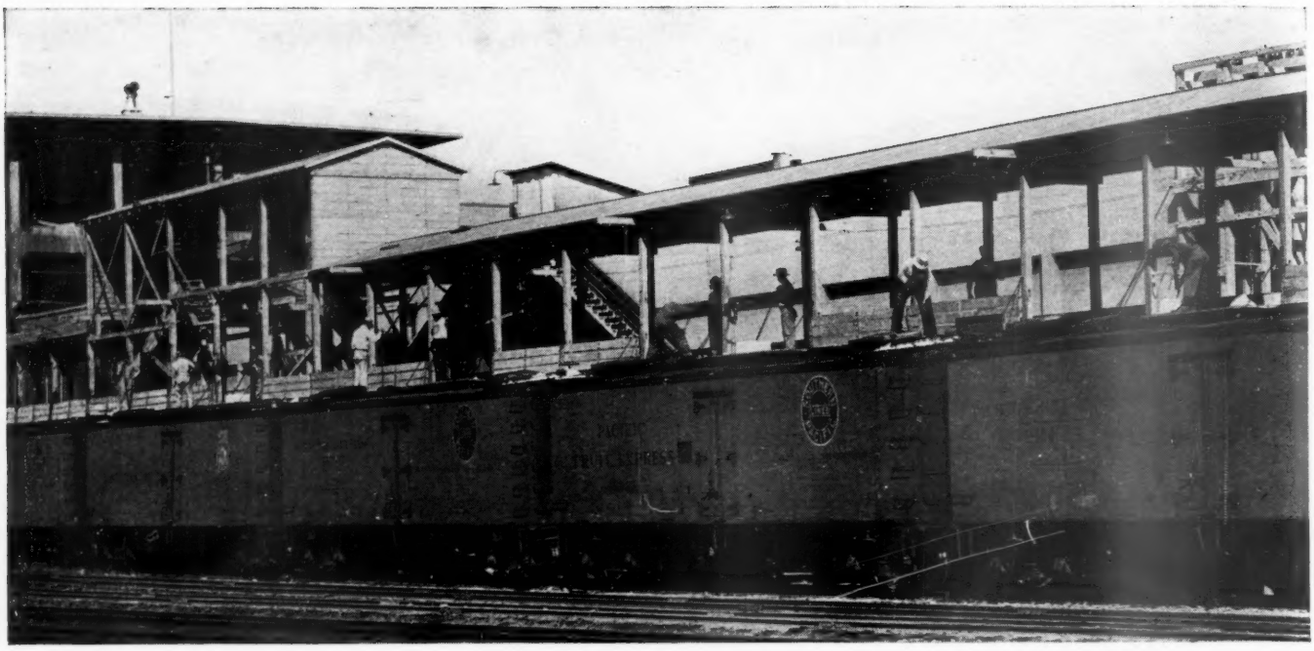
While the requirement concerning the compaction of embankments has not tended materially to increase the bid prices, the benefits in the form of reduced maintenance costs will be great. In most cases, the newly-constructed embankments will be more compact and, therefore, will have a greater weight per cubic foot than the material in embankments that have been in service for many years.

For many minor stream crossings an economy in construction has been obtained by the development of a design comprising metal-encased reinforced concrete pile bents carrying a heavy section I-Beam superstructure. The trestles are designed with spans up to 30 ft. in length and were developed for use in lieu of longer girder spans supported by massive wing abutments. The abutments consist of concrete piles supporting reinforced concrete bridge seats and backwalls.

The relocation of the railroads involves the following quantities: 4,500,000 cu. yd. of grading; 40,000 cu. yd. of concrete; 93,000 lin. ft. of timber piles; 24,000 lin. ft. of metal encased concrete piles; 2,750,000 lb. of reinforcement steel; 825 tons of cast iron pipe for drainage openings and 6,500,000 lb. of structural steel for bridges.

* * *

The New Haven's "Yankee Clipper" near Forest Hills, Mass.



An Icing Dock at Roseville, Calif., One of the Biggest Concentration Points

Perishable Handling—A Mighty Transportation Spectacle

New icing methods require changes in pick-up service and transcontinental schedules

THE prompt and efficient handling of fruits and vegetables from West Coast producing centers to the eastern markets, often more than 3,000 miles away, provides a spectacle unique in world transportation methods. The depression years have brought many changes in icing and operating methods and in schedules. At the same time, the railways have proved themselves competent to meet the constantly changing requirements and demands of the industry.

The movement of perishables from the Pacific Coast to eastern markets is extremely important to the railways of the country. This is particularly true of the western railways, in whose balance sheets the revenues earned in handling perishables represent a large item, especially since, under the provisions of the Fourth Section, they are, in effect, forbidden to compete for much other transcontinental traffic.

Accordingly, when depressed business conditions began to make themselves felt and the perishable market showed evidences of decline, the railways co-operated whole-heartedly in a campaign to bring these fruits to the distant markets in better and hence more salable condition. This involved new icing methods, which, in turn, required new methods in bringing the cars from the producing stations to the concentration points, and also reduced the actual running time from the concentration points to eastern markets.

The service given this West Coast perishable traffic is perhaps the most highly co-ordinated service given any traffic in this country. The railroads have specialized in the handling of this traffic for years, because they have realized that the needs of the producer, the shipper and the consumer required the highest class of service in order to effect the necessary wide, regular and prompt distribution of the traffic. By such distribution they have found that a volume of traffic can be obtained which justifies the additional expense incurred in handling it and in providing the necessary special facilities. The shippers and carriers have co-operated in perfecting this service. Some idea of the success which has been attained can be gained from a statement of Paul S. Armstrong, general manager of the California Fruit Growers Exchange, that "the railroad service, insofar as our industry is concerned, was never better in the history of the business. It is almost perfect."

Such service was not perfected without careful planning, heavy expenditures, and years of development. The record shows that schedules have been shortened materially. Ninth morning delivery at New York is now guaranteed on shipments from southern California and tenth morning delivery from the remainder of the state. Schedules from the north coast are equally fast. These schedules are maintained even when it becomes necessary to make up as much as 16 hr. because of delays of shippers in loading. An additional five hours is allowed for pre-cooling. These schedules are being maintained with remarkable regularity.

In order to provide adequate service, it is necessary to

store large numbers of refrigerator cars on tracks convenient to the loading points in the areas of production. Daily gathering service is performed so that the perishables can be consolidated promptly at the concentration points for train movement. Much double track has been built to accommodate this traffic and maintain the speed and precision of movement. Costly terminals have been built in congested areas to provide convenient, adequate facilities for receivers for receipt, holding, distribution and sale.

One of the most valuable services rendered is that of diversion and reconsignment. Shipments are usually billed to points west of the Missouri river, but may be and are diverted as many times as desired to any point or points the shipper may choose, at no charge if the diversion is accomplished at Chicago, St. Louis or west thereof. A small charge is made for reconsignment east of those points. This service is an invaluable aid in the proper distribution and marketing of perishables. It prevents local market gluts or shortages and tends to convert the enormous consuming territory into one large market.

Because of the perishable nature of the commodities involved, the carriers have developed highly specialized organizations for the sole purpose of providing the refrigerator service necessary. Large numbers of specially constructed refrigerator cars are supplied for this traffic. Pre-cooling and icing facilities have been built to afford proper refrigeration. As an indication of the efficiency of the service, claim payments made on perishables because of improper refrigeration average less than 25 cents per car.

Without this highly efficient transportation service, the perishable industry would be in sore straits and its marketing and distribution programs would be seriously disrupted. In order to handle this important traffic efficiently and properly to meet the needs of the traffic, the railroads have made large capital investments. The record shows that among other items, they have invested $182,574,319 in refrigerator cars; $15,000,000 in piers and auction market facilities in New York City alone; and $26,500,000 in initial and re-icing facilities. Many other heavy expenditures for equipment and facilities especially used in handling perishables have been made.

The initial and re-icing facilities of the originating lines; namely, the Southern Pacific, the Union Pacific, the Atchison, Topeka & Santa Fe, the Western Pacific, the Chicago, Milwaukee, St. Paul & Pacific, the Great Northern and the Northern Pacific, cost in the aggregate $26,506,824. In addition, ice plants built by private interests at the request of the carriers, which supply ice under contract to the carriers, represent a substantial additional investment. The investment in 66,944 refrigerator cars owned by the Pacific Fruit Express, the Santa Fe Refrigerator Dispatch, the Western Pacific, the Western Fruit Express, the Burlington Refrigerator Express and the Northern Refrigerator Car Company amounts to $182,574,319.

These cars are necessary to accommodate Pacific Coast perishables at times of peak movement without car shortage. Necessarily, at other times a large number of these cars are idle, this expense being incident to seasonal movements of fruits and vegetables. The number of refrigerator cars owned by the California transcontinental lines that were stored for the want of traffic between seasons or from December 1 to April 1, averaged 14,996 cars in 1933; and 14,529 cars in 1934. This compared with the total number of refrigerator cars idle in the entire United States in the same periods as follows: 1933, 39,490 cars; 1934, 32,340 cars. Even during the heavy shipping season, as late as September 14, 1934, there were 10,341 surplus refrigerator cars on the California originating lines.

Much of the double track on transcontinental lines would never have been built if it had not been for the fruit and vegetable traffic originating on the Pacific Coast. Without undertaking to cover specifically the amount of double track built in recent years because of this perishable freight traffic, the Southern Pacific double tracked its railroad for a distance of 139 miles between Roseville, Cal., and Sparks, Nev., over the Sierra Nevada mountains, at a cost exceeding $9,000,000, which would not have been necessary if it had not been for the perishable freight traffic. Similarly, the Santa Fe, between 1924 and 1928, built 132 miles of double track in New Mexico and Arizona at a cost of $6,500,000.

That railroad service has accomplished its aim of wider, greater and better distribution is shown by the fact that while West Coast perishables constituted only 27 per cent of the total perishable traffic unloaded at New York City in 1924, they amounted to 42 per cent of the unloads 10 years later.

The Originating Territory

The central California growing area is the largest in which this traffic originates. The Imperial Valley in southern California also produces many thousands of cars of perishables every season, as do a number of scattered valleys in the Pacific Northwest. The central California territory has gradually been extended in all directions as the railways adopted faster schedules, both on the pick-up service from the fields to the concentration points and for the transcontinental runs. Its northern boundaries are now approximately Ukiah, Cortena and Oroville, and it extends as far south as Solidad, Visalia and Exeter. Some idea of the size of the territory, from all of which identical schedules are maintained to the East, may be gained from the fact that its

Icing a Car of Perishables at One of the Intermediate Ice Docks

extent is approximately equal to the area of New Jersey, New York, Rhode Island, Maine and Vermont combined.

Approximately 235,000 train-miles are operated on a definite schedule by the California carriers each year in pick-up train service in assembling this perishable traffic and bringing it to the points of concentration. The facilities at concentration points consist of complete ice-manufacturing plants of large capacity, with specially constructed tracks serving icing docks sufficient to accommodate full trains of cars and at which the icing of all cars can be done in one operation at an average time of one minute per car. At some of these points, pre-cooling plants have been provided to accommodate shippers who desire to avail themselves of that means of refrigeration without themselves assuming the expense of such equipment at the point of initial loading.

The pick-up trains that bring these cars into concentration points cover the entire fruit and vegetable producing area of the state of California, some hauls being as much as 375 miles. The concentration points are Roseville for the Southern Pacific, Sacramento for the Western Pacific, and Bakersfield for the Santa Fe in

Modern Produce Terminals Are Provided in the East

central California; San Bernardino for the Santa Fe and Colton for the Southern Pacific and the Union Pacific in southern California; and similar concentration points in the Pacific Northwest.

The transcontinental train schedules from these points are uniform, being 146 hr. to Chicago, which afford seventh morning delivery at that important market, with close connections with eastern railroads that afford tenth morning delivery at New York and other Atlantic seaboard markets. An eight-hour reduction has recently been made in this schedule for trains handling perishables for Chicago proper, in order to afford seventh morning auction delivery.

In addition to the eight-hour reduction in time, the railroads have, during the past year, delayed the starting of their pick-up trains from midnight of the day of loading to 5 a. m. the following day to allow shippers to pre-cool their fruits and vegetables. This has the effect of shortening the schedule five hours from point of loading.

The basic schedule of 146 hr. to Chicago for eastern destination perishables or 138 hr. for Chicago proper perishables, allows for a run-off time of 16 hr., which means that any train leaving a concentration point, up to 16 hr. late, will be so operated as to arrive at Chicago on time, this in order to place all shipping points in the state of California on a comparable basis for the purpose of stabilizing the market. This makes a schedule of 130 hr. from concentration points. All of the plants are equipped to re-ice loads of fruit and vegetables with minimum delay. The new icing methods have made a marked difference in railway pick-up methods, since it is frequently necessary to switch the same track twice daily, once to pick up cars that are not pre-cooled, and again some five hours later to take cars that have undergone pre-cooling.

Pre-cooling in regular pre-cooling plants, where the produce is stored in cold storage rooms for the desired length of time, has been practiced by some shippers for many years. Pre-cooling within the car itself has come into active use only within the past few years. It is accomplished by placing ice and salt in the tanks of cars and forcing the circulation of air by portable fans placed in the car.

The ice bunkers of the car are filled with ice, to which salt is added. The fans are installed and kept in operation about eight hours, or longer if necessary, to bring the temperature of the load down to the point desired. After the pre-cooling is completed, the fans are removed and the ice in the tanks is replenished, again using salt. This pre-cooling service in the cars is performed by shippers, or by agencies employed by them.

Some carriers have pre-cooling plants where carload citrus fruit is pre-cooled. One of the latest systems employed in this service consists of single car units so arranged that each one may be operated separately. Refrigeration is supplied by electric-driven compressors located in the ice plant. These units are similar in principle to the design generally used for air conditioning; that is, they cool and circulate the air and control humidity. Warm air is drawn from the car into the pre-cooling unit and deflected through a series of cold brine sprays, which reduces the temperature. Then the air enters a set of eliminators to remove the proper amount of moisture. The dry cold air is drawn from the pre-cooling unit by a pressure-type fan driven by a motor, and forced through heavy insulated ducts into the hatches at one end of the car, circulates through the load, and is drawn out of the car through the car hatch at the other end into insulated ducts, which return the air to the unit, thus setting up a continuous cycle of air circulation.

Body icing of vegetables, that is, the placing of chunk ice on top of packages, has been practiced by shippers for many years. Recently, however, a new method of spreading ice over the load was developed and many shippers now use an ice crusher and blower. The ice is fed into a portable, power-driven machine which crushes it into fine particles, the ice then being blown through a flexible hose leading from the crusher and blower unit into the car at the door. The flexible hose permits the placing of the ice at any point on the load where it may be required. In addition to top icing at points of origin, retop icing is performed at certain points in transit where desired by shippers, with machines the same or similar types.

Eastern Operations

The rail lines operating east from St. Louis and Chicago handle the fruit, vegetables and other perishable traffic received from the western lines on fast schedules adjusted to protect advertised and guaranteed through schedules to eastern markets. Like the western lines, if any cars are delayed, the eastern delivering lines make special efforts to make up the time, even though it involves increased operating expense. The record of one eastern line, which handles a large portion of this traffic, in making delivery at the time ordered by the

consignee in 99.9 per cent of all cases is indicative of the class of service rendered.

Upon arrival at the yards which serve various eastern markets, these cars are placed in yards especially constructed for this purpose. On orders received from consignees daily, cars are switched out, moved to floats—in the case of traffic for New York—and unloaded at the auction piers at the times agreed upon. This arrangement permits the regular movement of traffic from points of origin without danger of flooding markets or of heavy loss to shippers.

The provision of these terminal facilities for the holding of cars, the switching incident thereto, the icing facilities, the floating equipment, the auction piers, etc., involve large investment on the part of eastern railroads. The investment in piers and auction market facilities alone exceeds $15,000,000.

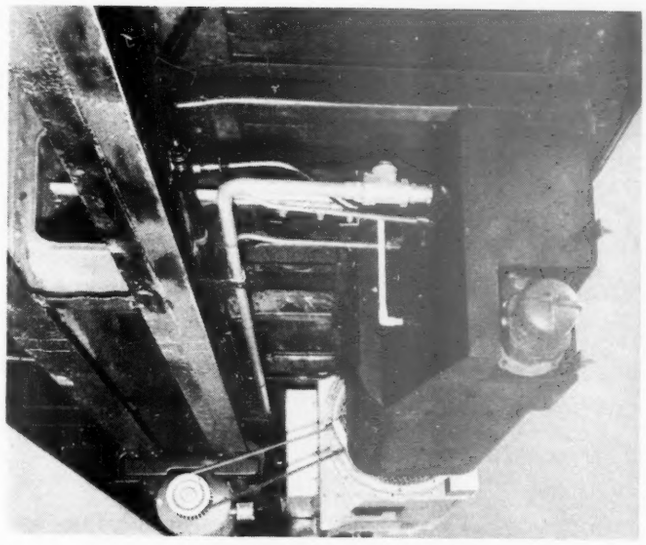
Icing facilities are maintained at all destinations of carload perishable traffic or arrangements made to secure such ice as may be necessary from local dealers, since the carriers are liable for failure to furnish adequate refrigeration service for the protection of the commodities transported, as may be directed by the shipper in accordance with the tariff provisions. Ice is likewise available for those shippers moving cars under any of the modified forms of refrigeration service, either after arrival of the cars at destination or at the regular icing stations which the cars pass in transit.

The nation-wide service, in which all of the railroads co-operate, is perhaps the most outstanding feature in the transportation of perishable freight. This co-ordinated service provides an elaborate set-up of passing reports to supply information to shippers as the cars pass agreed-upon locations extending from coast to coast, all of which makes possible the diversion of this traffic with distinct advantage to producers and consignees in stabilizing markets. Under this system, cars move to more favorable markets, giving intermediate cities the advantage of access to the large volume of through traffic moving to eastern markets. Under the stabilizing effect of these diversion privileges, the producer realizes greater net returns, which, after all, is the desire of the railroads.

Pullman Air-Conditioning Holdover Feature

THE direct mechanical air-conditioning system, supplied by the Pullman Standard Car Manufacturing Company, is designed to meet the full air-cooling requirements when train stops are frequent and stand-by power is available at terminals. To meet the condition of exceptionally frequent or long stops and inconvenient or inadequate stand-by power at terminals, an exclusive Pullman holdover feature has been developed and installed, as shown in the illustration. This consists essentially of a holdover tank from which an inexpensive solution of non-corrosive, non-poisonous liquid is automatically circulated through a coil adjacent to the evaporator whenever the train stops and the temperature would otherwise rise in the car. When the compressor is not cooling directly, it freezes ice out of this solution into horizontal ice columns. If the temperature rises in the car due to lack of power to operate the compressor, the cold liquid surrounding the ice columns is automatically circulated through a cooling coil by a thermostat which actuates a 32-volt motor-driven pump.

This holdover tank provides a cooling capacity equal to that furnished by a motor-driven compressor operating from a fully charged 1,000 amp.-hr. battery. Only 1½ hr. are required to charge the tank fully, as compared with the 8 to 12 hr. usually required to charge a dead 1,000 amp.-hr. battery. Moreover, the holdover tank may be fully discharged without affecting the electric auxiliaries in the car, whereas, should the batteries on an electric motor-driven system become discharged, the ventilating and lighting equipment become inoperative.



Partial View of Pullman Air-Conditioning Equipment as Applied Underneath a Car—Holdover Tank in Right Foreground

This thermal storage unit of the Pullman system is simple and positive in operation, and can be repeatedly charged and discharged without detrimental effect. It is charged during the time when compressor operation is not required for cooling or in the yards before train departure. It is said to require little maintenance as the only moving parts are a small motor-driven pump and the control switches.

The holdover tank proves its value especially on runs with long stops, being automatically recharged enroute between stops. Continuous cooling is thus provided, as the compressor functions above 8 to 10 miles per hour and the holdover handles the cooling at speeds below this point and during stops. The Pullman direct mechanical system with the holdover feature is designed to afford maximum economy in producing continuous cooling and this method of storing energy is exclusively a Pullman feature.

* * *

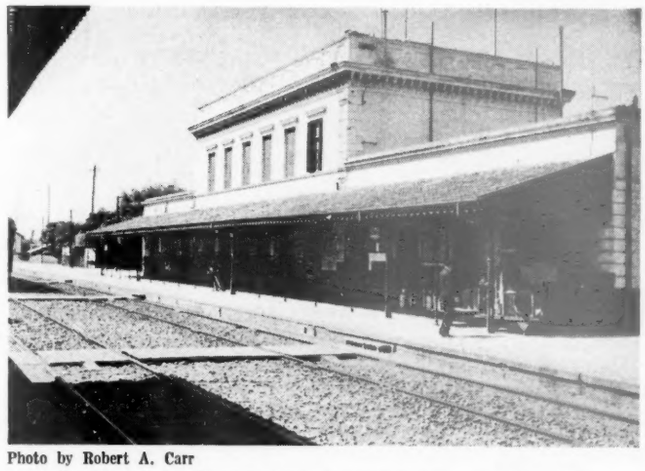
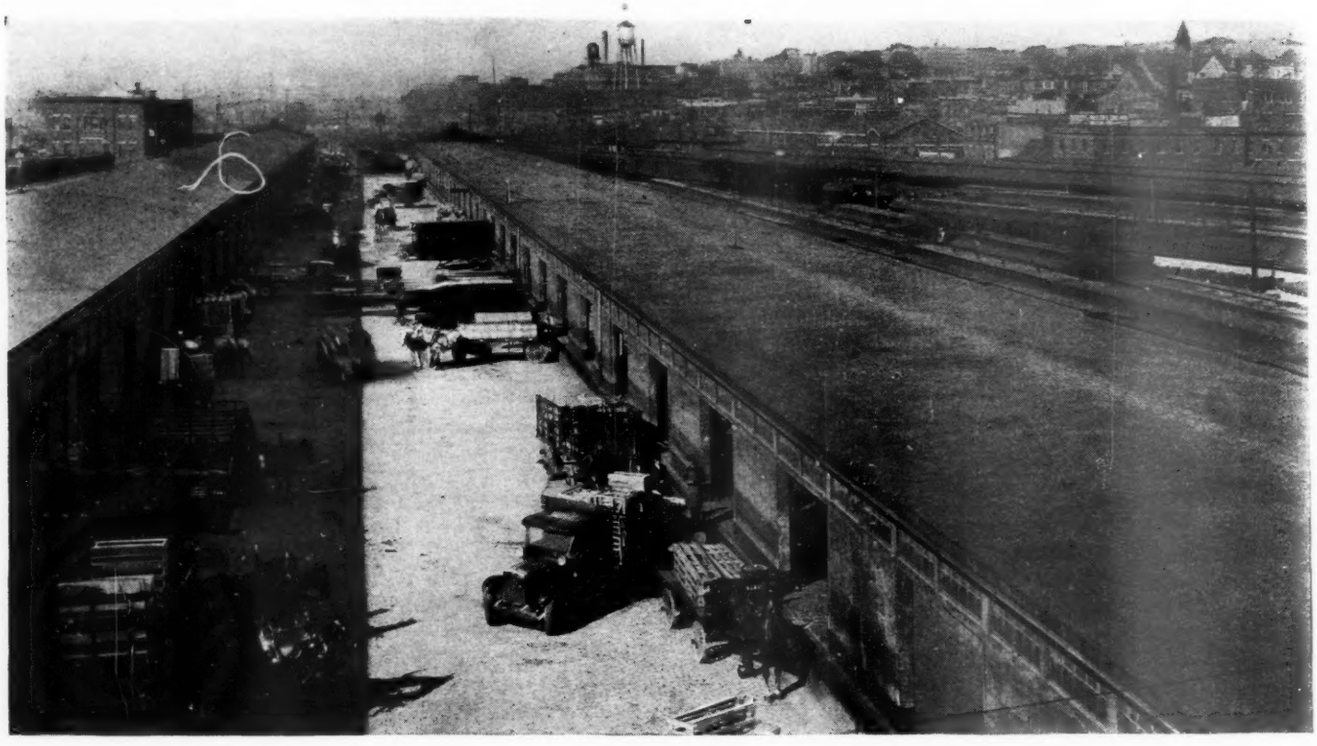


Photo by Robert A. Carr

Station of the Buenos Aires & Pacific at Junin, Argentina

Motor Transport Section



Vehicles of Cartage Agents Are Held in Readiness at All Times to Serve Demands of C.N.R. Shippers

Can Merchandise Traffic Be Regained?

Canadian National obtains remarkable results by increased speed and flexibility of service

THE Canadian National, for some months past, has been gaining an average of 3,000,000 lb. of merchandise traffic per month. This additional traffic has been regained as a result of the installation of store-door service, speeding up merchandise trains and merchandise handling, and by the use of trucks on station-to-station routes to provide more prompt handling and more flexibility. A complete description of the inception and earlier stages of the new service was published in the *Railway Age* of September 22 and October 27, 1934, since which time, however, many changes have been made and the service has been expanded materially. The new service involve three principal factors: Rates, convenience and dispatch.

Tariff Simplification

The original aim was to provide a modernized system of merchandise tariffs, simple in structure, readily intelligible and designed to encourage the movement of merchandise. Two such plans were selected for experimentation; (1) a single rate plan, which provides for the grouping of all articles into one standard class, and (2) a group rate plan which segregates articles into four groups. Experiments are being conducted simultaneously with each of these plans in order to determine definitely by practical experience which is the most desirable and effective one, having particular regard to simplicity, convenience to the public and reduction in freight station costs. It has been found that: (1) the reduction in the general average revenue of the railway per 100 lb., including the cost of cartage, is approximately the same for each plan, ranging from 25 to 27 per cent and (2) the weight per shipment waybilled subject to the provisions of each plan is approximately the same, ranging from 350 to 390 lb. The fact that these factors are equal obviate to a considerable extent the difficulties that would otherwise arise in determining the more satisfactory plan of the two.

In order to distinguish between the two plans, they will be referred to as (1) the "All Commodity P. & D. System" Tariffs C. T. 25—or the single rate plan, and (2) the "Classified P. & D. System" Tariff C. T. 28—or the group rate plan. The rates in each case include the cost of pick-up and delivery service.

The "All-Commodity P. & D. System," or the single rate plan, was originally made effective March 6, 1933, at 52 cartage stations in the area between Toronto, Ont., and Windsor, and was extended after five months' operation to include 50 additional cartage stations west and north of Toronto in Ontario. The rate level is approximately equal to third class station-to-station rates. Under this system, all articles of less-than-carload freight classified as such in the Canadian Freight Classification are grouped into one standard class or group, with this exception—that the rates do not apply on such pieces or packages as cannot be loaded into a standard box car or through the side door thereof, or to dynamite and high explosives, live poultry, livestock and bulk freight.

Results

The result was that tonnage increased substantially on traffic where the rate was cut the deepest, namely the higher classified commodities, but little, if any, gain was made in fourth class tonnage on which the rate had been increased to approximately the third class level, although it included the cost of pick-up and delivery service.

In view of these results and to recover fourth class tonnage in volume, and also to recover tonnage moving in larger quantities of mixed classifications, a supplement was issued to this tariff on May 6, 1935, which reduced the single rate level 10 cents per 100 lb. on shipments weighing 1,000 lb. or more, forwarded from one consignor to one consignee between distances approximately 50 miles or more, within the area where the tariff applies, with graduating rate reductions for larger shipments moving between stations in shorter distances. This modification of the original tariff has substantially increased the volume of fourth class tonnage and, to some extent, the volume of higher classified tonnage.

The Alternate Plan

The "Classified P. & D. System," or the group rate plan, was made effective May 1, 1935, at 201 cartage stations. This system applies between stations within a distance of 375 miles when the originating and destination stations are within the following area: Toronto, and east and north in the province of Ontario to North Bay and Sudbury, and in the province of Quebec, Quebec City and west thereof. It also applies to and from stations in this area and stations within the area of the "All Commodity P. & D. System." Under this system, l.c.l. shipments of articles listed in the tariff are classified into four groups with a rate table applying to each group. This system has been in effect several months and the records indicate at present that it is principally attracting lower class tonnage. This is the reverse of the experince with the "All Commodity P. & D. System" in its original form, or prior to the issuance of the supplement reducing the rate level on larger and heavier shipments.

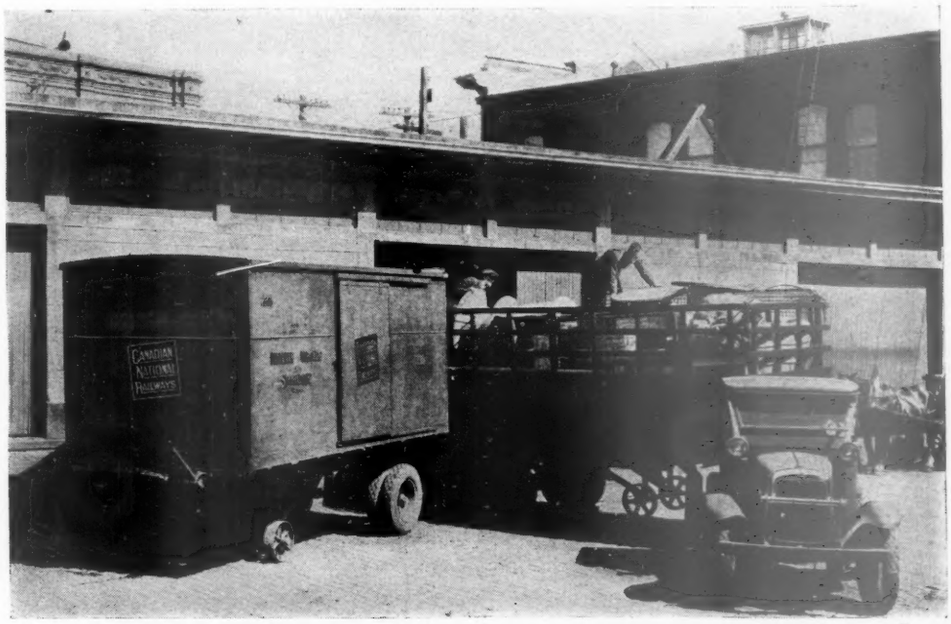
Each of these tariffs applies on traffic to and/or from non-cartage stations within the areas as referred to, but free street services are only provided when the origin or destination of freight is a cartage station.

Convenience

The standard packing requirements have been set aside, and articles are accepted when packed in such condition for shipment as to render their transportation reasonably safe and practicable. Credit accounts are available to patrons who prefer to make settlement for freight charges either weekly or periodically, instead of at the time of receiving from or delivering shipments to the cartage agents. The vehicles of the cartage agents of the railway are at the disposal of the shipping public at all times, and their use may be arranged for at any hour best suited to the convenience of the patrons.

Dispatch

The speed and regularity of l.c.l. dispatch is much improved and overnight delivery is available between the principal stations within a distance of 375 miles in the area where the pick-up and delivery service applies. This has only been made possible through the complete co-ordination of the several factors: (1) local cartage services between the freight sheds of the railway and shippers' and receivers' premises; (2) station-to-station trucking services between stations where train schedules cannot be adjusted without considerable added cost; (3) adjustment in and speeding up of freight train schedules; (4) handling of l.c.l. traffic in baggage cars of passenger trains; (5) acceleration of terminal switching to insure prompt placement at freight sheds of cars containing l.c.l. traffic, and the switching of such cars from the freight sheds at a late hour in the afternoon so as to insure dispatch on the same day of late after-



Station-to-Station Trucking Services Have Been Instituted Where Either Improved Service or Economy or Both Would Result

noon shipping; (6) revision of freight shed loading lists, and the elimination so far as practicable of transhipping tonnage enroute; (7) staggering hours of service of freight shed and freight office employees to permit of early morning unloading from railway cars, and morning delivery, also to protect the loading and forwarding on the same day of shipments received late in the afternoon.

Cartage Service

The utmost care is exercised in the selection of cartage agents. Only those who have had long contact with the public, who have experience and ability, and who own their vehicles are acceptable. There are 201 cartage agents of the railway in the provinces of Ontario and Quebec, owning and operating 650 vehicles. These vehicles are held in readiness at all times to serve the demands of the shipping public on pick-up and delivery tonnage in particular, and other cartage services in general. The railway does not require that these cartage agents carry vehicle insurance, although in almost all cases they do so for their own protection. They are bonded, in that they are empowered to sign shipping bills in the name of the freight agent when picking up shipments and freight bills when collecting freight charges. The railway is at present disbursing approximately four hundred thousand dollars annually to these cartage agents, which substantially adds to their earnings, and incidentally, is a direct saving to shippers and receivers.

Station-to-Station Service

When either improved service or economy or both were evident, the railway instituted station-to-station trucking services. These services are operated in each case by reliable and experienced operators, owning or controlling the vehicle equipment employed. For such services, the railway pays according to the kind and class of services required, mileage operated, class of freight transported, type of vehicle employed, and other such controlling factors. These cartage agents conduct their operations under proper provincial regulation authority. They are required to take out and pay for complete vehicle insurance coverage to the amount in each case as designated by the railway. They are also bonded as in the case of the local cartage agents. Services of this character at present in effect are—between Kitchener, Preston, Hespeler, Galt and Brantford, distance 43 miles; between St. Thomas and London—18 miles; between Hamilton, Dundas and Burlington—12 miles; between Toronto and Weston—5 miles; between Toronto and New Toronto—7 miles; between Toronto and Oshawa—32 miles; between Oshawa and Bowmanville—9 miles; between Oshawa, Whitby and Port Perry—21 miles; between Napanee and Deseronto—7 miles; between Sudbury and Copper Cliff—3 miles; between Cobourg and Port Hope—5 miles; between Belleville and Picton—25 miles.

An example of the application of these station-to-station trucking services may be of interest. A truck, with a trailer, leaves Simcoe Street freight shed, Toronto, daily except Sundays and public holidays at 9:30 a.m., with tonnage shipped the previous afternoon at Kitchener, Stratford, Windsor, Chatham, London, Hamilton, Ottawa, North Bay, Kingston and other principal stations, destined to Oshawa, Bowmanville, Whitby, and Port Perry, arriving at Oshawa about 11:00 a.m., and connecting there with trucks serving Bowmanville, Whitby and Port Perry. At Oshawa the truck is employed in local cartage service up to 5 p.m. In the return direction, this equipment leaves Oshawa at 5 p.m., with tonnage originating at Oshawa, Bowmanville, Whitby and Port Perry, arriving in Toronto at 6:30 p.m., where the shipments are immediately transferred into outgoing merchandise cars. The other station-to-station trucking services are similarly operated.

Analysis of Tonnage Increase

The percentage of gain or loss, in tonnage, by classes, Canadian Freight Classification, is the only accurate rule-of-measurement that can be applied in determining the kind and class of tonnage each tariff is attracting. The results are as follows:

The "All Commodity P. & D. System," in its original form as compared with station-to-station rates, July 1933-32—

1st Class tonnage increase 73.0 per cent
2nd Class tonnage increase 62.6 per cent
3rd Class tonnage increase 16.7 per cent
4th Class tonnage increase 11.1 per cent

The "All Commodity P. & D. System" in its modified form, i. e. supplement May 6, 1935, authorizing reduced rates for larger and heavier shipments, as compared with the "All Commodity P. & D. System" in its original form, July 1935-34.

1st Class tonnage increase 16.0 per cent
2nd Class tonnage increase 13.2 per cent
3rd Class tonnage increase 11.0 per cent
4th Class tonnage increase 133.7 per cent

The "Classified P. & D. System" as compared with station-to-station rates, July 1935-34.

1st Class tonnage increase 6.7 per cent
2nd Class tonnage increase 22.6 per cent
3rd Class tonnage increase 12.8 per cent
4th Class tonnage increase 29.7 per cent

Conclusion

The contentious problem at present is to determine a unified system of tariffs, simple in structure, readily intelligible, and designed not only to encourage less-than-carload tonnage to the railway, but also to reduce railway operating costs. In the foregoing, the following facts have been disclosed relative to the three collection and delivery systems:

First—That, the dispatch with respect to shipments waybilled subject to the provisions of each tariff is equal.

Second—That, the convenience to the public, notably with respect to greater latitude in packing requirements, is equal.

Third—That, the reduction in the general average revenue of the railway per 100 lb. is equal.

Fourth—That, the average weight per shipment is equal.

With equality of these factors, the tariff problem is greatly simplified.

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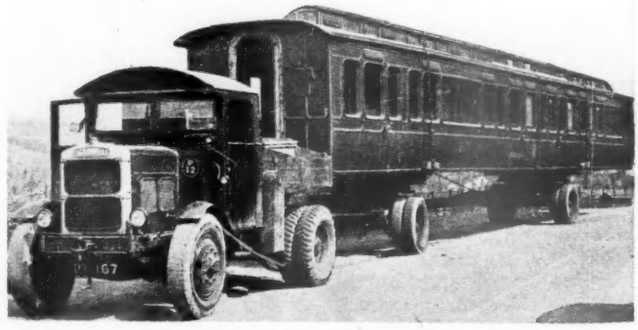
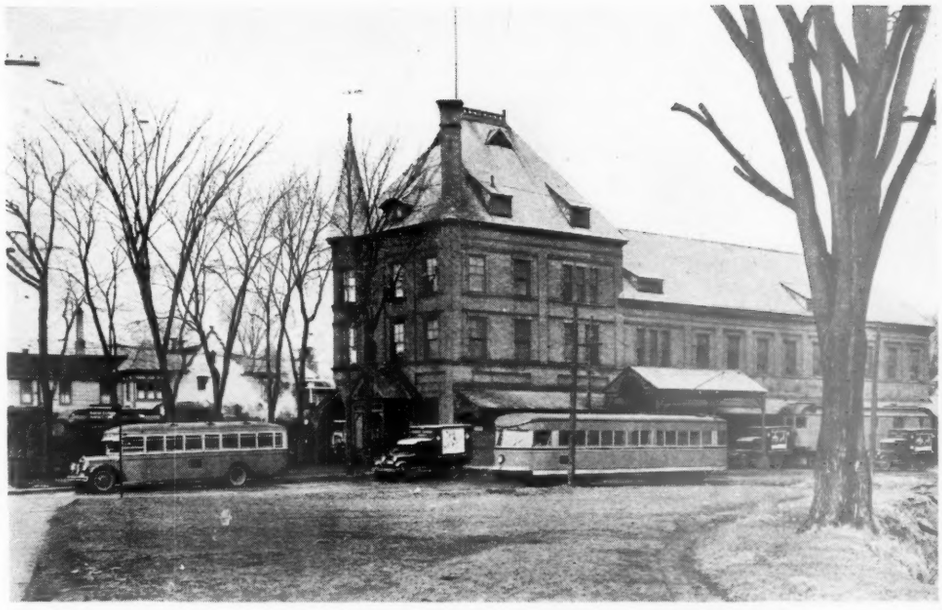


Storedoor Delivery of a Passenger Coach in England. One of the Cars of Queen Victoria's Funeral Train Being Transported to a Seaside Resort Where It Will Serve as an Artist's Dwelling



Co-ordination on the F. J. & G. at Its Gloversville, N. Y., Steam Railroad Station. Picture Shows Bus, a Steam Train (behind Bus), a High-Speed Inter-Urban Trolley Car, a Mail and Express Trolley Car and Motor Trucks of the Railway Express Agency

How the F. J. & G. Uses Motor Vehicles

Variety of reasons prompted this short-line railroad to establish its present highway routes

THE Fonda, Johnstown & Gloversville, in an endeavor to adjust its services to current conditions in the transport field, has in recent years been developing a co-ordinated set-up, embracing steam railway, bus, truck and trolley services. It is now operating 13 buses and one truck on several routes, paralleling its present and abandoned rail lines, and in intra-city service.

The F. J. & G. is a short-line railroad, serving several important manufacturing towns in the east-central part of New York State and connecting with the main line of the New York Central at Fonda, N. Y. Its steam line extends from the latter point generally in a northerly direction to Johnstown, Gloversville and Broadalbin Junction, and thence easterly to Broadalbin, a total of 19.7 mi. This is now used entirely for freight service, except for one mixed train daily, except Sundays, in both directions between Gloversville and Broadalbin. Also, it operates intra-city services in Gloversville and Amsterdam—the former with buses and the latter with trolleys—and a high-speed inter-urban electric line between Gloversville and Schenectady, 33.10 mi., with a Sulphur Springs Junction-Fonda branch which permits the operation of a Gloversville-Fonda trolley line. This latter is now used entirely for mail and express, and thus, aside from the Gloversville-Broadalbin mixed train, the Gloversville-Schenectady electric line remains the only inter-urban rail-passenger service offered by the road.

Entered Highway Field in 1929

This road first entered the motor transport field in 1929 when it substituted buses for its intra-city trolley lines in Gloversville, and between Gloversville and Johnstown, 4.6 mi. In the two following years it established inter-urban bus routes as follows: Gloversville to Northville, 17 mi.; Gloversville to Broadalbin, 9.5 mi.; Gloversville to Fonda, 9 mi.; and Fonda to Scotia, 27.45 mi. Its one truck is operated between Gloversville and Northville, carrying freight in station-to-station service only.

Why Routes Were Established

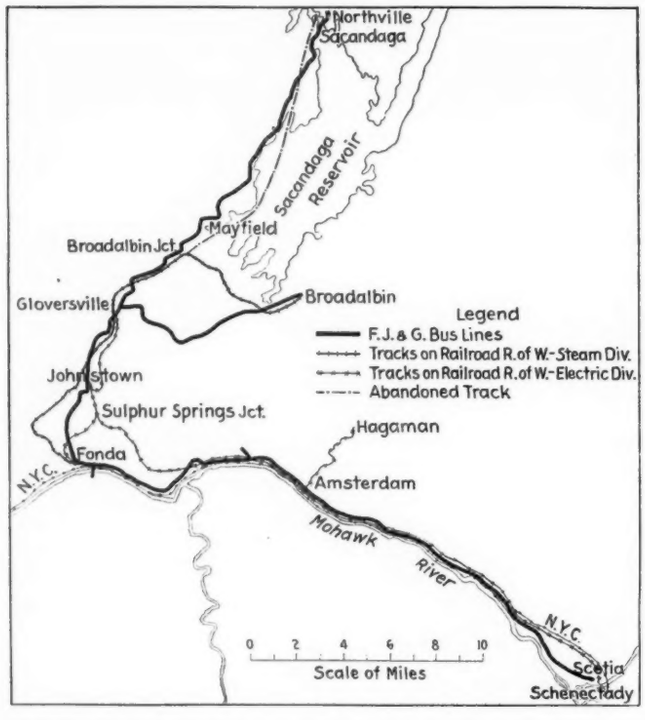
The substitution of buses for trolley services in Gloversville came as an economy move at a time when the road was faced with large demands for repaving between its tracks. The inter-urban route between Gloversville and Northville was established when the flooding of Sacandaga Reservoir, constructed to control the Hudson river's flow, inundated and thus forced the abandonment of a section of the F. J. & G. steam line which had formerly served that territory. This abandoned section formed the substantial part of a Gloversville-Northville line which, prior to the advent of the automobile, had done a heavy passenger business to and from the summer resort which the road developed, and still owns and operates, at Sacandaga. Buses on this 17-mile route now make five daily round trips and four on Sundays. The truck makes three daily round-trips, serving the stations which the road maintains at Mayfield and Northville.

The next bus route to be established was that between Gloversville and Broadalbin, this being in substitution for a steam train. The buses, however, give more service, for, whereas there was formerly but one train in each direction daily, there are now two round trips daily, three on Saturdays and one on Sundays.

The Gloversville-Fonda route, an extension of the original Gloversville-Johnstown line, was established as

a substitute for trolley service, although, as stated above, trolleys still carry mail and express between these points. The buses, however, are able to operate on faster schedules than the trolleys and also the highway route better serves the city of Johnstown. Service on this line is coordinated at Fonda with the New York Central's main-line train services; twelve daily round trips (11 on Sundays) are operated.

The latest route to be established was inaugurated in 1931 between Fonda and Scotia, a few miles outside of Schenectady. A certificate for the run into Schenectady was denied and thus the line has to be extended to that city through a connection at Scotia with the buses of the Schenectady Railway Company. On this line, which also provides a Fonda-Amsterdam service, four daily round trips are operated. The principal reason for its establishment was to preempt the route and thus pre-



Map Showing Relationship of F. J. & G. Highway Routes to Its Steam and Electric Rail Lines

clude any undermining of the Gloversville-Schenectady electric line's position.

All of the foregoing services, including Gloversville's intra-city lines, are protected with 13 Mack buses, while one 2½-ton Mack truck covers the Gloversville-Northville freight service. Four of the buses, each with capacity for 27 passengers, have also mail-express compartments and these handle mail and some express on inter-city routes; six of the other buses have seating capacity for 25 passengers each, while the remaining three are 16-passenger vehicles. All of this equipment is pooled and available for shift from one service to another in any manner which seems most economical and expedient. All start out each morning from Gloversville, where they are garaged and where the railroad's car and locomotive shops, now augmented by motor vehicle repair facilities, are located. Thus, for example, the Fonda-Scotia bus, in proceeding from the garage to the former point to commence its day's work, provides an early-morning Gloversville-Fonda service; and likewise when returning for the night it makes a similar through run. Also, where schedules permit, Fonda-Gloversville buses are continued through to cover the Gloversville-Northville run.

Employees Available for Rail or Highway Work

Practically all of the bus drivers are former railway men and are available for transfer to that service at any time. This makes for an especially flexible and advantageous set-up, since a man who has been driving a bus part of the day may be assigned for the remainder as a steam locomotive engineer or as the motorman of a high-speed trolley. The road operates under agreements with the Amalgamated Association of Street and Electric Railway Employees of America, but not with the steam railroad employee brotherhoods.

It is difficult to segregate the revenues of the inter-urban bus lines because of several factors such as the differing fare bases and the influence of intra-city revenues which are included. As a composite whole, however, the bus services are profitable; in 1934 they produced approximately $87,000 of the F. J. & G.'s total gross revenues of $600,000. The average operating cost per bus-mile for that year was 19.5 cents, including depreciation calculated on the basis of a five-year life for buses; for September, 1935, this cost per bus-mile was 15.5 cents and in October it was 17.2 cents.

Different Fare Bases

Varying fares of one, two, and three cents a mile are charged on the buses, the first being in effect on the Fonda-Scotia line to make its basis uniform with that of the Gloversville-Schenectady electric line, on which an experiment with this low rate was launched several months ago. The two-cent-a-mile rate applies on the Gloversville - Northville and Gloversville - Broadalbin routes, while the three-cent rate is in effect between Gloversville and Fonda. Railroad freight rates are charged on the truck line.

The road has set up no subsidiary to operate its motor carrier routes; the highway services are conducted directly under the supervision of the railway's operating officers. In addition to the general superintendent, with headquarters at Gloversville, there are two operating superintendents—one of these, also at Gloversville, supervises all highway service as well as steam operations. There is also an assistant engineer of shops whose jurisdiction extends to motor vehicle maintenance.

Trucks Set Four-Day Record—Chicago to Los Angeles

A CARAVAN of five trucks, carrying a total revenue load of 90,000 lb. of freight, arrived in Los Angeles on December 17, to complete the first four-day, Chicago-Los Angeles motor freight run in transportation history. This test run was made as a preliminary to the announced establishment of a regular five-day truck service between Chicago and Los Angeles, with daily departures from both terminals, early in 1936, by the Keeshin Transcontinental Freight Lines.

This new route between Chicago and Los Angeles, through co-ordination with the company's eastern lines, is also expected to bring about seventh morning delivery between New York and Los Angeles in both directions, and to speed up deliveries materially from and to intermediate points.

One of the Maintenance Trucks on the Job

New Haven Motorizes Still Further

Uniform stores system and use of trucks by track gangs characterize year's motor transport activities

THE New York, New Haven & Hartford, one of the pioneers in rail-highway co-ordination, and, with its fleet of more than 1,500 units of automotive equipment, one of the largest bus and truck operators in the country, has extended and refined its operations still further in 1935. Savings estimated at between $100,000 and $200,000 annually are expected from the inauguration of a unified automotive stores handling system and the use of motor trucks by track gangs.

The Subsidiary Companies

The first of these plans will unify and consolidate the stores handling of all of the various subsidiaries of the New Haven which operate trucks and buses. The motor transport activities of these various companies are widespread and of varied kinds. The New England Transportation Company was formed as a truck and bus operating subsidiary of the railway. It operates trucks and buses intrastate and interstate in Massachusetts, Rhode Island, Connecticut and New York. Its bus operations comprise important through routes in the territory served, as well as numerous train replacement lines. Its truck activities include straight over-the-road hauls as well as rail-highway co-ordinated routes, and, in addition, co-ordinated water-highway service in connection with the New England Steamship Company, another N. Y., N. H. & H. subsidiary. In addition, its trucks are widely used in terminal intra-station transfers to save switch engine mileage, as, for example, in such terminals as Providence, R. I., which, as the largest local point exclusively on one railway in the country, is served by many scattered freight receiving stations.

Removable Rack-Side, Tarpaulin-Top Trucks Serve a Variety of Purposes

Another important subsidiary making large use of motor transport is the Connecticut Company, owning the street railway franchises in South Norwalk, Bridgeport, New Haven, New London, Norwich, Hartford, Waterbury, New Britain and other smaller Connecticut cities. This company has replaced many of its street cars with buses, and now owns approximately 350 units of highway equipment.

Other street railway subsidiaries of the New Haven which operate numerous buses are the Springfield Street Railway Company and the Berkshire Street Railway Company, the former confining its activities to intrastate service in Springfield, Mass., and vicinity, while the latter not only serves the cities of North Adams, Mass., and Pittsfield, but also operates interstate between these cities and Bennington, Vt. Other subsidiaries include the County Transportation Company, the Victoria Coach Lines and several smaller companies.

The motor transport activities of these various companies grew to such proportions so rapidly that it was necessary to set up stores organizations and stores accounting systems on an individual basis to start with, to meet the varying needs of the different companies. Co-ordination of facilities was practiced to some extent, as for example, the New England Transportation Company equipment is garaged in Connecticut Company facilities throughout that state. However, the need of a uniform stores handling system was apparent.

It was not a simple matter to establish such a system, in view of the varying operating conditions and the

(*Continued on page 866*)

Modern Equipment Solves Maintenance Problems on the Pacific Greyhound Lines

Pacific Greyhound Makes Progress

Long distance routes and train replacement services both prove successful in attracting passengers

THE Pacific Greyhound Lines, in which the Southern Pacific owns 39.05 per cent of the common and 22.78 per cent of the preferred stock, has been of material aid to the S. P. in rail-highway co-ordination, by operating bus "parlor car" tours in connection with through rail movement, by train replacement on branch lines and by replacing an unprofitable suburban service operation on the Northwestern Pacific with bus operation.

The P. G. L. is an outgrowth of the former Southern Pacific Transportation Company, combined with several independent lines, and its growth to the point of operating between 20,000,000 and 30,000,000 bus miles per year has taken place entirely in the depression years. In 1929, several motor coach lines operating on the Pacific Coast were affiliated under the ownership of the Pacific Transportation Securities Company. The following year the Pacific Greyhound Lines, Inc., was formed as an operating company to take over the bus lines of the Pickwick Stages, the California Transit Company, the Peninsula Rapid Transit Company, the Pacific Auto Stages, the Golden Gate Stages, the Pacific Coast Motor Coach Company, the Kern County Transportation Company, the Calistoga & Clear Lake Stage Company and the Southern Pacific Motor Transport Company. The latter company operated a large number of routes, principally as train replacement services, with most of its mileage in Oregon, although it had a few routes in California as well. The Pacific Greyhound Lines has continued the operation of these train replacement routes and others as well, as will be indicated later.

Since its organization, the P. G. L. has taken over several other companies, and now operates in the states of Oregon, California, New Mexico, Arizona, Texas, Nevada and Utah. The northern terminus is Portland, Ore.; the southern, San Diego, Cal.; and the eastern termini, where transcontinental connections are made, are Salt Lake City, Utah; Albuquerque, N. M., and El Paso, Tex. In other words, its termini correspond almost exactly with those of the western lines of the Southern Pacific.

The principal through routes are between Portland and San Francisco; San Francisco and Salt Lake City; San Francisco and Los Angeles; Los Angeles and Albuquerque; and Los Angeles and El Psao. Between San Francisco and Portland and between Los Angeles and San Francisco, routes are operated through the interior valleys, with additional lines along the coast connecting the cities, while separate routes are operated between Los Angeles and El Paso.

Nitecoach Operation

The growth of this company's traffic has been aided by a constant trend toward modern equipment. For example, the Pacific Greyhound Lines, in connection with other Greyhound companies, inaugurated a nite-coach service between Los Angeles and Kansas City, effective May 1, 1935. This is an outgrowth of the original bus sleeper service started in 1929 between San Francisco and Los Angeles, which has been in successful operation ever since. Leaving San Francisco at 6:55 p.m., these sleeper coaches run through to Los Angeles in 12 hr. 35 min., making only operating stops to change drivers enroute, and handling only through passengers.

One of the Nitecoaches Operated by the Pacific Greyhound Lines

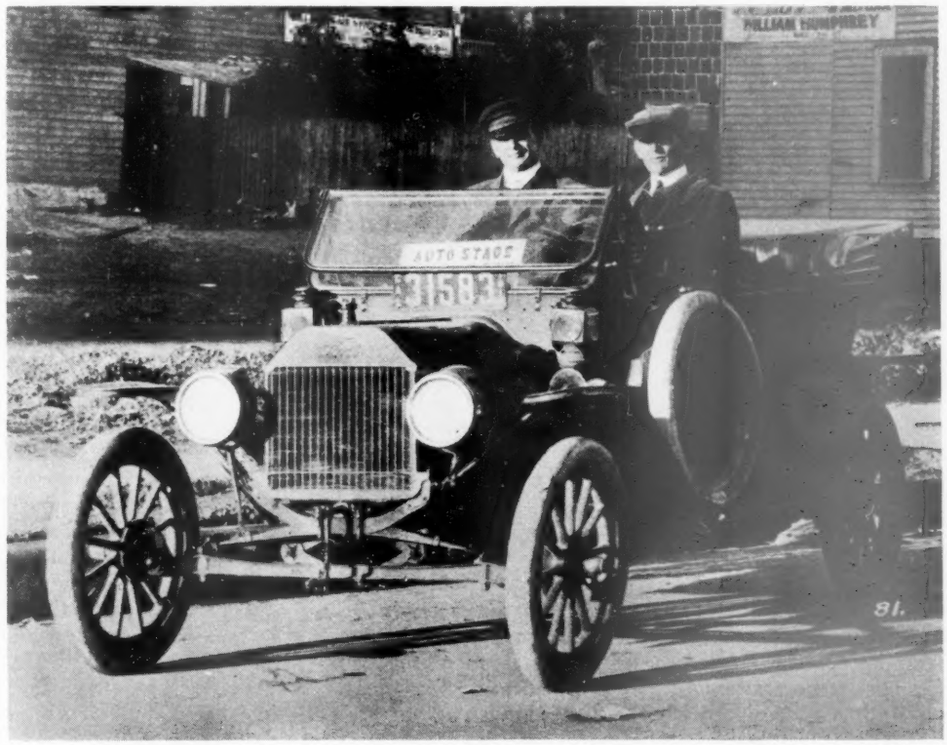
Northbound, the buses leave Los Angeles at 6:45 p.m., arriving in San Francisco at 7:25 a.m.

Rail Co-operation

The Pacific Greyhound Lines, after taking over the services of the Southern Pacific Motor Transport Company, have continued to operate the train replacement services, and in numerous instances, have expanded these services to take care of passenger traffic on branch lines that were either abandoned, or on which steam passenger train service had been discontinued. In addition, the P. G. L. now operates a bus route between Vallejo, Cal., and Crockett that supplants a former S. P. ferryboat service, in which the ferries were becoming antiquated. At the same time, a new highway bridge was built over Carquinez straits, making it much cheaper and more efficient to handle the passenger traffic via highway than via water.

Besides the train replacement lines in Oregon taken over from the S. P. Motor Transport Company, the P. G. L. operates train replacement lines in California between Salinas and Monterrey, Hollister and Gilroy, Santa Cruz and Boulder Creek, Santa Cruz and Davenport, Santa Cruz and Watsonville Junction, Crockett and Calistoga, Napa and Santa Rosa and between Truckee and Tahoe. A train replacement line is also operated between Alamogordo, N. M., and Cloudcroft.

Rail tickets are honored on the Pacific Greyhound



How It All Began—Auto Stage Operation in California Twenty Years Ago

Lines for either the whole or partial journey from points in Oregon north of Ashland to Portland, between Medford, Ore., and Weed, Cal., between San Francisco-Oakland and Stockton, between San Francisco and Palo Alto, and between Los Angeles and points in the Santa Paula valley.

On June 12, 1935, a plan consolidating the northern peninsular suburban passenger traffic on the Northwestern Pacific, a S. P. subsidiary, between San Francisco and Ukiah, was placed in effect. Under this arrangement, the bus and rail fares were equalized, the tickets of the N. W. P. and the P. G. L. were made interchangeable and a more flexible service was provided.

Rail-Highway Services

The Pacific Greyhound Lines also serve as a joint agency with the Southern Pacific in providing motor transport detours to points of scenic interest for rail passengers in the West. One such operation is the Apache Trail, between Globe, Ariz., and Phoenix, which traverses the Tonto National Forest, and passes the famous Arizona cliff dwellings, as well as Roosevelt Dam. Another detour runs through the Redwood Empire of northern California and southern Oregon, which may be taken by rail between San Francisco and Eureka, Cal., via the N. W. P.; by P. G. L. buses from Eureka to Grant's Pass, Ore., crossing the Siskiyou range; or from Eureka to Marshfield, Ore., along the cliffs of the Oregon coast, and then using S. P. trains from either Marshfield or Grant's Pass to Portland.

On round-trip rail tickets from the East to the coast it is also possible for the passenger to include the all-expense California "parlor car" tours in his itinerary. These bus tours are operated for the S. P. by the P. G. L. in special deluxe bus equipment, and include several of the beauty spots between San Francisco and Los Angeles.

Having been formed originally as a consolidation of many independent companies, and having since acquired a number of other lines, the P. G. L. necessarily acquired a miscellaneous collection of equipment. For the purpose of efficient maintenance, however, the equipment has been standardized as much as possible, with the result that, of the 325 buses operated at present, 225 are equipped with General Motors Company motors and 100 with Hall-Scott motors.

New Haven Motorizes Still Further

(*Continued from page 863*)

complexity and extent of the operations. The railway has, however, maintained an efficient and experienced research and statistical bureau for some years, accustomed to making studies of this sort, and, with the assistance of this bureau, the problem has been solved and unification is now in progress. The best features of all the various requisition forms and work reports have been selected and new, simple, yet effective forms have been prepared and will be used throughout the many companies.

Motor Trucks for Maintenance Work

The other major development of the year in New Haven motor transport activities was the purchase and installation by the railway of 51 three-ton motor trucks for use by permanent, fully-equipped, motorized floating gangs in connection with the New Haven's reorganization of its track maintenance forces, described in the *Railway Age* of December 7, page 747. Other railroads in various parts of the country have made experiments in the use of highway equipment as a track maintenance auxiliary, but never on such a large scale as this, or with such thoroughness of organization. On the New Haven, the new trucks supplement 49 trucks already in use in connection with bridge and building and water service work. Through the use of the trucks, the minimum time is required in getting the men, tools and materials to and from the site of work; losses of thousands of man-hours due to train interferences have been eliminated, and work train service and expense have been decreased materially. One of the reasons for the use of the trucks was the flexibility afforded by such operations.

The new trucks are of two kinds, one type having a fixed canopy top with roll side curtains, and the other having a stake body with removable side racks, top bows and tarpaulin. Thirty-five of the trucks have 15-ft. bodies, while the remainder have 12-ft. bodies. All of the trucks have a capacity of 6,000 lb., and are fitted with longitudinal side seats. These are either removable or hinged so that the full platform width of the body can be used for trucking tools, materials or supplies when not transporting the men. In addition, the larger trucks are fitted with a removable longitudinal center seat so that their normal seating capacity of 16 can be increased to 24.

The operators of the trucks are rated as maintenance helpers, with a rate of pay slightly above that of the trackmen. When not actually driving the trucks or working on or about them, these men assume the duties of the rest of the men in the gangs and engage in whatever track work is being done. The extent of the use of the trucks in transporting men and materials is evidenced clearly in the operating reports, which show daily operated mileages ranging from 20 to as much as 180 miles. These larger mileages are not due to long hauls, but rather are the summation of several shorter trips which keep the trucks busy during the day.

Recognizing that adequate maintenance of the trucks is essential to their effective and economical operation, a thorough arrangement has been set up in this regard. The drivers are required to take care of routine greasing and oiling work, and are responsible generally for the condition of their trucks. Lubricants, as well as gasoline, are secured from either the service stations of the Connecticut Company or the New England Transportation Company or from private service stations under contract.

After each successive 2,000 miles of operation, the trucks are given a general inspection by the work equipment forces of the maintenance of way department, and after each 8,000 miles of operation, they are run into the service stations of the company subsidiary bus lines for detailed inspection, oiling and cleaning. At the end of each 24,000 miles of operation, the trucks are completely overhauled at one of the service station repair shops.

To guard against oversight in the regular periodic inspection, greasing and shopping of the trucks, the checking of running mileage limits was put in the hands of the statistical department of the road. This department, which receives and compiles the daily mileage figures of each of the trucks, notifies the track supervisors promptly when each of their trucks must receive one of the three classes of attention—a general inspection, a detailed inspection, or overhauling. Through this arrangement, which is supplemented by a comprehensive set of rules for the operation of the trucks, it is felt that maximum service will be secured from them, at minimum overall cost.

Broad Opening from Driver's Seat to Interior of Truck Body Facilitates Sorting and Handling

New Express Agency Truck Body

Provision for loading and unloading at front facilitates pick-up and delivery work

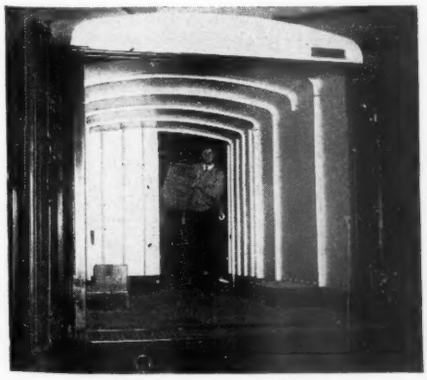
THE Railway Express Agency has recently placed in service a new type of motor truck body which, among other advantages, is designed to facilitate the loading and unloading of express traffic in pick-up and delivery service. It provides for loading or unloading at the front, adjacent to the driver's seat, as well as in the conventional manner at the rear.

Known in automotive circles as the "cowl length body," it is mounted on a 1½ ton chassis of the latest model. Approximately 130 vehicles of this type are already in operation at various points in the eastern section of the country and some 225 more have been ordered for future delivery.

In addition to the advantages mentioned above the new body, several views of which are presented herewith, increases the load capacity of the truck. While it is a light-duty vehicle, low in initial and operating cost, it has 500 cu. ft. capacity and thus serves equally well for business that might otherwise require a larger truck as for traffic adapted to lighter equipment.

It is completely rectangular in form, with sliding doors on both sides in the front. That on the left, beside the driver's seat, enables him to take his place at the wheel quickly from that side. On the opposite side is the other door, providing an entrance into the body itself; the driver can also reach his seat from this entrance. The rear doors are of the four-leaf articulated type, which are said to have met with favor among drivers; and the floor height is approximately 2 ft. 8 in. above the ground, making loading and unloading a faster operation.

Recent tests with the "cowl length body" show that 90 per cent of the shipments moved can be handled by the driver through the front entrance. Only occasionally does he find it necessary to open the rear doors, thus



Articulated Rear Doors Give Complete Access from Loading Platform or from the Ground

Low Body Plus Ample-Sized Sliding Doors Gives Easy Access to Driver's Compartment

Sliding Doors with Built-In Window Provide Easy Accessibility and Protection from Weather

saving time and adding to the security of the operation.

The first trucks of this design were tried out in Bridgeport, Conn., for a period of about eight months. The driver in charge, operating in the busiest and most congested sections of that city, found, in addition to the advantages listed above, that it is easier to handle than the conventional type of truck.

Legal Aspects of Motor Carrier Bill*

By F. A. Leffingwell

ON October 1, the Interstate Commerce Commission assumed jurisdiction over interstate transportation of persons and property by motor vehicles. The effect of this law will depend largely on the attitude of the shipping public. If the shippers co-operate with the Interstate Commerce Commission, and if the commission at the outset secures some substantial fines against shippers that aid and abet violations of the law, it will go a long way toward bringing order out of the chaos which has existed for several years.

The law applies generally to common carriers, contract carriers and brokers engaged in interstate commerce by motor vehicles. It will not apply to private carriers, except that the commission is required to establish reasonable requirements to promote safety of operation, if need therefor is found. It may prescribe rules governing employees, hours of service and standards of equipment. The law, if applied at all to private carriers, cannot have much effect on their operations.

Many types of motor transportation are excepted from the act. For instance, it will not apply to school buses; taxicabs and similar vehicles with a capacity of not more than six persons; hotel buses; motor vehicles operated by the Secretary of the Interior in connection with the national park service; motor vehicles used by farmers in transporting their agricultural commodities or carrying supplies to the farm; motor vehicles operated by agricultural co-operative associations; trolley buses operated by electric power; motor vehicles used exclusively in carrying livestock, fish and agricultural commodities; motor vehicles used exclusively in the distribution of newspapers; transportation within municipalities and zones adjacent thereto and commercially a part of such municipality; the casual occasional or reciprocal transportation by a person not so engaged as a business.

Common carriers must secure certificates of public convenience and necessity. In order to secure such certificates, applicants must show that they are fit, willing and able properly to perform the service proposed and that the proposed service is or will be required by the present or future public convenience and necessity. This type of operation involves a movement between fixed termini over regular routes, and the holder of a common carrier certificate must operate only between such termini and over such routes as authorized. However, he may add additional equipment and facilities as needed. An applicant might secure a certificate for one truck and add 100 additional trucks under the same certificate if business required them and provided his operations were confined to the termini and routes authorized.

Contract carriers must secure permits. The applicants must show that they are fit, willing and able to perform the service of a contract carrier as proposed and that such service will be consistent with the public interest and the policy of Congress as declared in the act. The permits, when issued, must show the nature of the goods to be transported and the scope of the permit, i.e., the territory within which the applicant may operate. These operations are not confined to fixed termini or fixed routes, but are limited to the type of business and the territory set forth in the permits.

Brokers must secure licenses. Brokers are persons other than motor carriers, or the agents thereof, who sell or offer to sell any transportation subject to the act. Anyone who holds himself out by solicitation, advertisement or otherwise, to provide or arrange for such transportation is a broker. Applicants for brokers' licenses must show that they are fit, willing and able to perform the service proposed and that the service will be consistent with the public interest and the policy of Congress as declared in the act.

The so-called grandfather clause applies alike to common carriers, contract carriers and brokers. If a common carrier was in operation on June 1, he is entitled to a certificate without proving convenience and necessity. If a contract carrier was in operation on July 1, he is entitled to a permit without further proof. A broker in operation on October 1 is entitled to a license without further proof. All of them must make proper applications within 120 days from October 1. If they do not submit applications on or before January 28, the grandfather clause will not do them any good.

Rates

The common carriers must file their rates and must abide by them. This section of the act has been postponed. When it becomes effective, they will be subject to heavy fines if they haul any passengers or property in interstate commerce without first having filed a rate to cover the movement. That rate must be reasonable and non-discriminatory. It cannot be changed except upon 30 days' notice to the commission and the public.

The common carriers in the southwestern states of Arkansas, Louisiana, New Mexico, Oklahoma and Texas are now making plans to publish and file a joint tariff to apply for all operators. They will perhaps designate an agent to act for each of them in compiling the tariff or tariffs, similar to the plan followed by the railroad members of the Southwestern Freight Bureau. Their present plan is to adopt the less-than-carload rail rates and the rail classification and exceptions. No truck load rates are proposed. The details of the plan, the location of the publishing office, the number of tariffs to be issued, etc., have not yet been worked out.

Contract carriers must likewise file rates but all they need publish and file is the minimum rates which they will charge. They must not charge less than the rates shown in their tariffs but they can charge as much more as they desire. If, after filing such tariffs, they desire to charge less than the rates filed, they must file new tariffs on 30 days' notice to the commission and the public, reducing the minimum rates already filed.

The commission does not have the power to initiate rates in the first instance but on complaint or on its own motion, it may suspend and investigate any rates filed by either common carriers or contract carriers, except that it cannot suspend the first rates filed. It may also, upon complaint or upon its own motion, investigate the lawfulness of the rates on file. If, after due hearing and investigation, it finds such rates to be unreasonable, discriminatory or otherwise unlawful, it may prescribe

(*Continued on page 873*)

* From an address delivered before the Southwest Regional Advisory Board at Dallas, Tex.

Motor Transport Regulation in Europe

Competitive problems similar to those confronting the railways of the United States are dealt with abroad

HIGHWAY competition with the railways in Europe has assumed the same general course as in this country, with the exception that such competition has been keener because of the considerably smaller average load in freight business abroad and the shorter average haul on both freight and passenger business. On the other hand, the freight unit in Europe has never reached the proportions of our carload units, and, with relatively smaller carload units, a greater flexibility of operations is possible there in meeting such competition than is the case in this country.

The intitial steps taken by the European railways in meeting this competition was an agitation—frequently successful, particularly in the case of the government-owned railways—to reduce railway taxation, or its equivalent, and to increase the taxation of the motor carriers. Somewhat later, when highway competition continued to increase despite all their efforts along these lines, the railways turned to the problem of securing greater supervision over the granting of certificates to operate on the part of the various branches of the governments charged with this supervisory duty. In many cases, notably Germany, this was successful in solving some of the problems.

Within the last two years, however, a marked tendency toward co-ordination of rail and highway services has been evidenced almost everywhere in Europe, and the railways are entering more and more into the field of motor transport, either in connection with their rail service, or in motor transport as such, entirely divorced from the rails, except for the ownership of subsidiaries.

The problem of service to meet competition has also led the European railways toward increased use of motor transport and increased rail-highway co-ordination. It was the thought, at first, that speed was the prime consideration in regaining the lost traffic, but this was followed quickly by the discovery that the rate factor was also of prime importance, and the eventual conclusion arrived at was that a combination of speed, price and a relatively equal flexibility of operation presented the only solution. This flexibility of operation could only be obtained through increased rail-highway co-ordination.

The International Railway Congress Association has recently completed a survey of the steps taken in the various European countries to meet highway competition and to co-ordinate rail and highway service. Arranged by countries, the following presents some of the highlights of the facts brought out in the course of this investigation.

Great Britain

Until 1930, there was no legislation in force in Great Britain with regard to concessions for either passenger or freight traffic. Freight traffic by motor truck was completely free from restrictions until 1934. The law of 1930 regulated motor passenger transport concessions. When considering requests for concessions, the necessity for the new service was investigated first of all. All public bus services are submitted to these regulations.

England and Scotland have been divided into 13 traffic areas. In each of these areas, there is a special traffic commission and a traffic commissioner to see that the regulations are observed and applied, as well as the other prescriptions laid down by the same law for freight traffic as regards the condition of the motor vehicles used, the maximum speeds allowed, the qualifications and working hours of the driving staff, etc.

The railways have the right to oppose the introduction of new services by other firms and the above-mentioned authorities have to deal with their objections. However, the railways are given no privileges when conducting motor transport services themselves. If they wish to organize a motor service, they must submit, in principle, to the same regulation as other undertakings.

A new law concerning freight traffic came into force on January 1, 1934. In addition to increasing the taxes paid by motor truck services, especially in the form of higher license fees, this law introduced obligatory concessions for all transport motor trucks running outside the local areas, including private transport. Three kinds of license are granted:

(a) Licenses for firms engaged in haulage work on behalf of a third party.

(b) Licenses for operators whose motor vehicles are intended first of all to be used for the business of the firm itself, but also carry other people's goods for payment.

(c) Licenses for purely private transport.

When a (c) license is issued, no preliminary investigation is made into the need for the service. Such a concession is never refused. But it can be limited, according to the trade of the firm asking for the license, to certain kinds of goods and to certain routes or traffic

Trucks Used in Cartage Services of the Great Western of Great Britain

zones. This latter restriction can also apply to the issuing of a (b) license. On the other hand, an (a) license is granted only for all kinds of goods and the whole country. Unlike a (c) license (a) and (b) licenses are issued only after the need for the new service has been established. The law contains no clauses relating to the transport rates. In this connection, likewise, no restriction can be imposed when the concession is granted.

It is expected that prevention of unfair competition against the railways, which is the main object of the law, will be achieved in part by the restriction, in accordance with the new regulations on concessions, of the number of firms and vehicles taking part in road motor transport services, but above all by the additional financial charges falling on motor trucks. These additional charges are partly direct, by means of the increased taxes collected from them, and partly due to the more rigorous control imposed by the law of 1930 on the condition of the vehicles and the qualifications and working hours of the staff.

Ireland

Actual legislation on concessions has only been passed within the last few years. In passenger traffic, apart from the regular services, occasional services operated by haulage firms must now obtain a concession as well. Demands for a concession can be refused for reasons of public interest. In addition, the granting of a concession can be subjected to certain conditions, such as a minimum number of services, fixed timetables, transport rates and the working hours of the staff. In freight traffic, except for purely private transport and public carriers operating within 10 to 15 miles around some of the large towns, the 1933 Act makes it necessary to obtain a concession. This obligation also extends to public transport work done by motor truck at irregular intervals.

The law begins by making a distinction between existing services and proposed services, and then between the other transport services known as "authorized" services. The authorized firms, those authorized by royal decree or by the law to provide the services, are in actual fact the Irish railways alone. Other firms can only obtain a concession for the traffic handled by them previously, and for the same number of vehicles previously used for these services. As regards new traffic, other firms are only allowed to operate additional services if there is a real need for them and no railway wishes to work them. In addition, a concession granted to a firm not in the authorized operations can be limited to given districts or even to given kinds of goods.

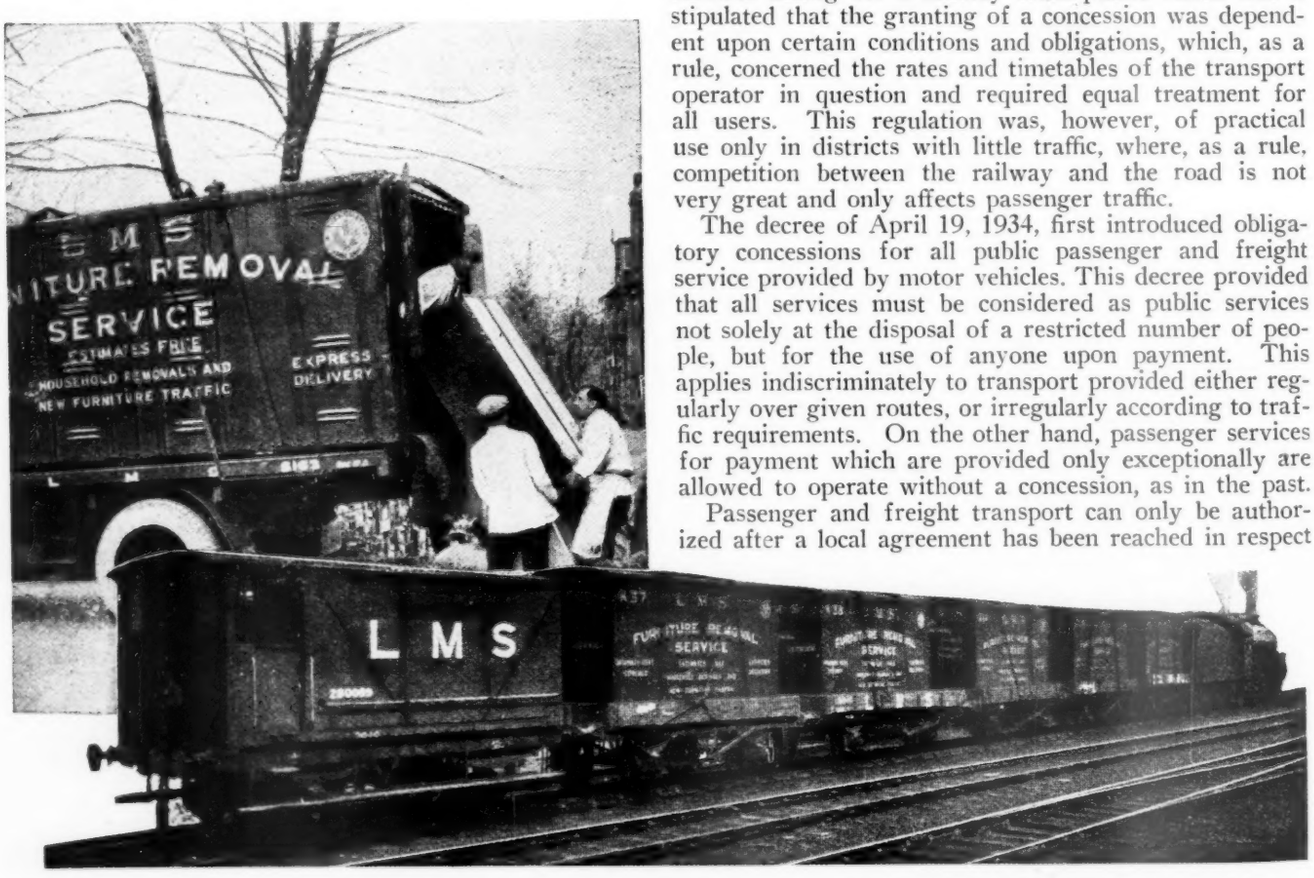
All concessions carry with them the obligation to provide the service, but, though fixed rates are not prescribed for the other firms, the authorized operations are required to submit maximum rates for approval. The law also includes clauses relating to the taking over of other services by the authorized operators. In this case, the latter have to compensate not only the other firm, but within limits, the staff employed by it. The other firms can, for their part, ask for their services to be taken over and compensation paid if such services are threatened by the motor services of an authorized agent.

France

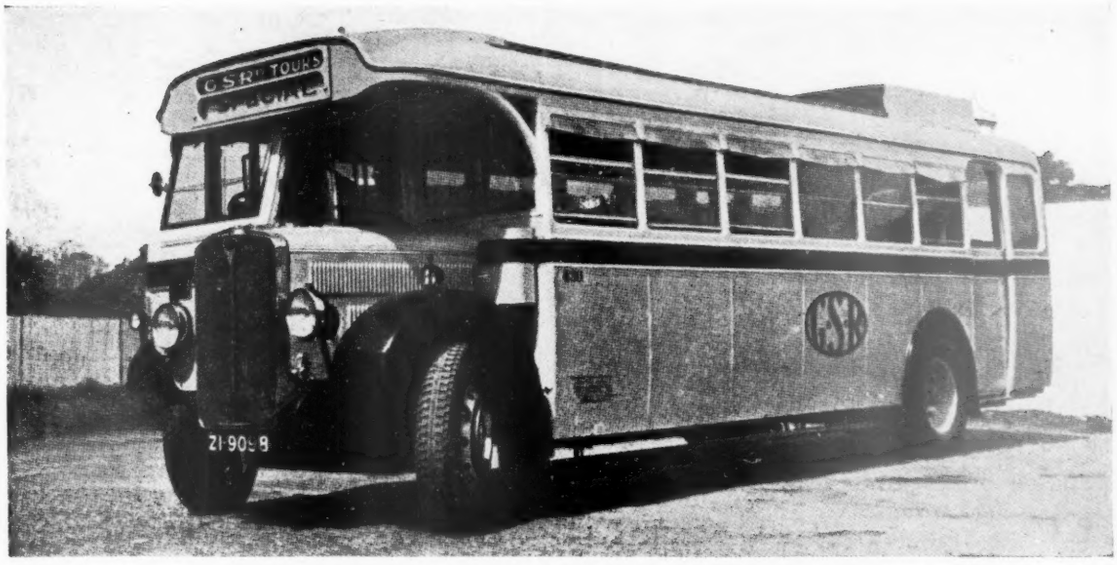
Until 1934, there were no legal regulations dealing with concessions. In both passenger and freight traffic, any one could set up regular services without preliminary formalities. All that was necessary was a declaration to the authorities. Only in the case of motor services asking for a subsidy from public funds was it stipulated that the granting of a concession was dependent upon certain conditions and obligations, which, as a rule, concerned the rates and timetables of the transport operator in question and required equal treatment for all users. This regulation was, however, of practical use only in districts with little traffic, where, as a rule, competition between the railway and the road is not very great and only affects passenger traffic.

The decree of April 19, 1934, first introduced obligatory concessions for all public passenger and freight service provided by motor vehicles. This decree provided that all services must be considered as public services not solely at the disposal of a restricted number of people, but for the use of anyone upon payment. This applies indiscriminately to transport provided either regularly over given routes, or irregularly according to traffic requirements. On the other hand, passenger services for payment which are provided only exceptionally are allowed to operate without a concession, as in the past.

Passenger and freight transport can only be authorized after a local agreement has been reached in respect



Containers Are Used in Co-ordinated Rail-Highway Furniture-Moving Services of the London, Midland & Scottish of Great Britain



Motor Coach Operated by the Great Southern of Ireland

to the division of the traffic between the motor carriers and the railway. The decree makes provision for the setting up of what are known as co-ordination commissions, composed of representatives of the railways and public transport firms, under an independent president. If these representatives fail to agree among themselves, the matter is referred to arbitration. The agreements between the railways and the public transport firms, as well as the arbitration decisions, are effective only after approval by the minister of public works. This approval can be subjected to certain conditions concerning, among other things, rates, timetables, a certain obligation to operate and carry, and equality of treatment for all users.

Two such agreements have been made between railways and motor transport firms. Both are concerned mainly with passenger traffic, but also make provision for freight traffic. According to these agreements, many small stations and certain sections of line of secondary importance will be closed down as far as the passenger traffic is concerned and replaced by motor services. On the other hand, many motor services will be discontinued, the owners to be partly compensated by the railway. High-speed traffic between places which will continue to be served by the railways is, in principle, to be reserved exclusively for the railway.

Spain

A law passed in 1924 is still in force, which makes concessions obligatory only for regular public passenger and freight services. The concession is granted by the local authorities for given routes. It is generally agreed that this system has not given good results because it has given the right of monopoly to many small concerns, some of which are not capable of giving adequate service, because it ignores all traffic of an irregular nature, and because, consequently, it is not of sufficient importance, in practice, in the case of freight transport. Owing to these obvious defects, the introduction of new regulations governing concessions has been under investigation for some time.

Belgium

A law passed in 1932 contained new regulations by which all public motor passenger transport services must obtain concessions, and firms desirous of operating them must be approved by public authorities. The national railways do not have to obtain authority for the motor services they set up between stations in place of train services.

A new bill is intended to make it necessary to obtain concessions for all freight motor transport services and authorizations can only be granted if there is a need for the new service. The organization proposed by this new law is evidently similar to that in force in Great Britain. As in Great Britain, the chief remedy for competition is, according to this proposed Belgian law, to restrict the number of motor transport operators and the vehicles used by them, to increase, by means of taxation, the financial cost of motor transport and to impose, if need be, such conditions upon motor transport operators as will force them to adopt a really economic method of operating. The new Belgian bill contains no clause relating to the rates to be charged, nor does it prescribe any particular action on the part of the railways and the motor transport firms to achieve methodical collaboration.

Holland

Only passenger traffic handled as regular service has to obtain a concession; freight traffic is entirely unrestricted. However, the introduction of a system of concessions, together with an investigation into the need for the service, is under consideration for freight traffic. The system it is proposed to introduce is inspired by the British methods. Consequently, in Holland the new organization will be based principally on restricting the number of operators and of the vehicles to be used in motor transport services, and on increasing the financial charges upon this transport. Another projected law is intended to set up a so-called transport fund to which all methods of transport shall contribute, and which would be used to meet the expenses of certain railway services which up to the present the railways have had to pay themselves.

Switzerland

For regular or occasional public passenger traffic carried in motor vehicles, a monopoly has for a long time been vested in the government. As a rule, this exclusive right is exercised by the post office administration, which most frequently operates the services itself, although in certain cases, they are provided on behalf of the post office by paid contractors. There are two forms of concessions for passenger traffic. The holder of an (a) concession is authorized to handle a given traffic which the post office does not wish to deal with, the concession

being granted, if need be, for a considerable time. On the other hand, a (b) concession covers only a temporary service and in practice, is used mainly in dealing with seasonal traffic.

There are no laws dealing with concessions in freight traffic. However, the legislative bodies have passed some new regulations in agreement with the convention signed, in 1933, between the federal railways and the privately-owned Swiss railways on the one hand, and motor transport representatives on the other, and submitted as a common proposal to the legislature. This new law makes it necessary for all motor truck transport companies to obtain concessions for operations exceeding a distance of 6.2 miles within a town area. Apart from this strictly limited area, only purely private transport is allowed and this as yet does not have to be authorized. No concession is granted until the need for the service has been investigated.

The law makes provision for two kinds of concession:

(a) N concessions, granted only within an area of 18.6 miles for given services or traffic districts, but apart from this for all kinds of freight; and

(b) S concessions, for given kinds of freight, such as furniture removals, perishable goods, etc., for which proof has been given that motor transport is essential. This latter concession is granted without any limitation as to distance and for all traffic. A holder of an S concession is not allowed to do private work.

The holders of N concessions are members of an association, of which the federal railways and the private Swiss railways, as well as various associations of users, are also members. The federal railways deal exclusively with this association and its members for their motor transport. Holders of N concessions handle all freight for distances of less than 18.6 miles unless the consignor expressly asks for railway transport. In addition, it is intended to extend the service by which the merchandise traffic is distributed by motor truck over certain sections.

A particularly noteworthy point of this new legislation is the fact that for distances above 18.6 miles, the freight traffic, with the exception of S concessions and purely private transport, is reserved not only for the railway but definitely for its railway services.

Italy

Only the regular public motor services are covered by legislation concerning concessions. It does not affect to any extent the freight traffic which, in this country, is nearly always handled by occasional transport services.

Germany

An article describing the present German system appeared in the Motor Transport Section of the *Railway Age* of June 23, 1934, page 930.

Portugal

Since June 28, 1933, a decree on transport by heavy motor vehicles and their adaptation to railway transport has extended the obligation to obtain authorization to public transport by motor truck where handled as regular services. Services in competition with a section of the railway are reserved for operation by the railway in preference.

Czechoslovakia

Under a law passed in December, 1932, all public motor transport for both passenger and freight traffic, whether operated as regular or occasional services, must obtain an authorization. Only agricultural, industrial, commercial and private passenger transport, including the transport of employees and workmen by vehicles belonging to the firm employing them, are exempt. The authorization is not given if there is no need for the service, if public interests oppose the service, or if the condition of the highways does not permit the transport in question. The state railways have the right to collaborate in the procedure for delivering authorizations, and, in addition, have the privilege of organizing regular services themselves.

Occasional services can only be authorized for short distances within given areas.

Austria

By a law which became effective on January 1, 1932, the system of obligatory concessions for passenger service was reorganized. The railways were given the right to operate motor services on which the concession has been asked for by some other undertaking. In the case of freight traffic, new regulations were also introduced by the law of June 9, 1933.

Motor truck transport for payment is only allowed on the condition that fixed minimum rates are charged. These rates are fixed by the authorities on the basis of the cost of motor transport, and, generally speaking, in such a way that the short-distance traffic will fall to the motor and the long-distance to the railway. According to the nature of the transport, the dividing limit is fixed at between 31 and 62 miles.

Private transport of agricultural, industrial and commercial firms, in its turn, has been restricted in the sense that it is no longer permitted, except in a few rare cases, for distances of more than 62 miles. Such firms are not allowed to carry in their vehicles freight belonging to other consignors. The most noteworthy feature in the Austrian regulations is the restriction of this latter sort of transport, a restriction unknown in any other country.

Hungary

The system of concessions was reorganized by a law of 1930. Public motor transport outside town limits is reserved, in principle, to the state itself. The state can, however, concede its operating rights in this connection to certain firms for a given time. All former concessions were cancelled as of October, 1932. New concessions can be granted to private firms only for transport over a maximum distance of 18.6 miles. Owing to insufficient control, these regulations did not work out well in practice, and were superseded in 1933 by a governmental decree which transferred the right to grant concessions to the state railways, on the condition that they would grant concessions in agreement with an association in which all the motor transport operators have been grouped. The railways also belong to this association, together with the motor truck subsidiaries belonging to them. A committee composed of representatives of the railways and of the association not only grants concessions, but also directs to a large extent the way the transport services are carried out.

The country has been divided into seven areas in which the motor transport firms can freely carry out their services on their own behalf as well as in the service of the state railways on certain given routes. Outside these districts, no motor transport services can be provided. Only private agricultural, industrial and commercial transport operators are exempt from these regulations.

Jugoslavia

A law passed in March, 1932, makes it necessary for professional motor firms handling passengers and freight traffic to obtain concessions. The license, which is also required for occasional transport services, is not granted

if the activities are likely to affect concerns already in existence. In addition, the granting of a concession can be made dependent upon certain conditions intended to restrict competition in the public interest. According to the law, authorized firms have to obey the same general regulations as the railways as regards rates and the obligation to transport.

Rumania

By a law passed in July, 1930, the state retains the monopoly of public motor services between towns. However, it can concede this right not only to the railways and post office administration, but to private companies for a certain time subject to certain royalties.

Poland

A law passed in 1932 makes it obligatory to obtain authorization for all public motor services between towns, whether regular or occasional. Only purely occasional transport, and, in freight traffic, private transport, is exempt. The authorization is not granted until a preliminary investigation has been made into the need for the service. This law has not yet come into force, except for passenger transport, its application to freight transport having been postponed several times.

Denmark

In Denmark, freight carriers by motor truck have not been required to obtain an authorization up to the present, except in the case of regular services between given places. For passenger traffic, on the contrary, a concession must be obtained not only for regular services, but also for occasional transport.

Sweden

After a preliminary attempt to control competition to some extent by applying a decree of June 20, 1930, dealing with the maximum speed of motor vehicles and the working hours of drivers, a new decree was published in June, 1933, which not only enforced the former regulations but altered to some extent the procedure for obtaining authorizations and the conditions under which concessions are granted. At the present time, the definition of a regular service differs from the old conception, for those services are now considered as regular when the vehicles do not always travel by the same route between two places. On the other hand, in freight traffic a certain obligation to carry has now been introduced, which applies to all regular services. The activity of an authorized operator is, generally speaking, limited to a given traffic area and transport outside this area can only be accepted if the place of departure or arrival is within the area covered by the firm. When there is a question of authorizing new firms, an investigation is made into the need for the new service, as well as the economic value of the operation under consideration.

Legal Aspects of Motor Carrier Bill

(*Continued from page 868*)

new rates which will conform to the requirements of the law.

In order to enforce the Motor Carrier Act, the commission has created a new division known as Division 7, composed of four of its members, which will have supervision of all matters relating to motor trucks. Under that division a motor carrier bureau has been established. This bureau will establish district offices in various sections of the United States, one of which will be located in the southwest. These district offices will have direct supervision over operations in their districts and will dispose of all routine questions without the necessity of clearing through Washington.

There is provision for utilizing the services of state commissions and a joint board, consisting of representatives of those commissions, will have direct supervision over many matters that would ordinarily be handled directly by the Interstate Commerce Commission. The commission may ask such joint board to hold hearings and grant certificates, permits and licenses, or suspend, change or revoke such certificates, permits and licenses; hear applications for approval of mergers, consolidations, etc.; and complaints as to rates, fares and charges. Much of the detail work may be handled by these boards composed of state representatives but the Interstate Commerce Commission has final jurisdiction and exercises supervisory control over these joint boards.

Shippers or carriers guilty of violating the provisions of the law as to rates and charges are subject to fines of $500 for each offense, provided it is the first offense, and $2,000 for each subsequent offense. The law is similar to the railroad law in that respect and its enforcement will depend largely on the attitude of the shipping public toward it. The state laws have been difficult to enforce because few fines have been assessed against shippers for violation of the law. If the federal authorities crack down with some heavy fines against large shippers that violate the law, the truck operators who do want to give rebates will find very few that will take them.

Increased Responsibility

Section 219 is an important provision of the new Motor Carrier Act. This requires common carriers by motor truck to issue bills of lading covering shipments which are delivered to them for transportation and provides that the initial carrier shall be liable to the lawful holder of such bills of lading for any loss, damage or injury to such property caused by it or by any other common carrier to which the property may be delivered while being transported under a through bill of lading. The law further provides that an initial carrier which pays a claim for loss or damage in accordance with the requirements of Section 219 shall be subrogated to the rights of the shipper so far as a claim against the carrier that actually caused the loss or damage is involved.

This is a new provision so far as motor trucks are concerned and it places on the common carrier motor trucks the same liability that has for many years existed on the part of railroads. Few shippers have realized the risks they have assumed in the past in sending shipments long distances by motor truck when several different operators or lines were required to complete the transportation contract. In case of loss or damage, before the shipper could legally recover, he had to determine definitely what operator was responsible for the loss or damage and that operator had the right to demand that he be sued in the county of his residence. The new law will be a big movement over old conditions in that respect.

The usual protection in the way of insurance covering cargo and liability to third parties, maximum hours of service, etc., are provided in the act. It should prove very beneficial to the shipping public and to those using the public highways, but it will cost the federal government quite a bit of money each year to enforce it properly.

Communications . . .

Thoughts Inspired by Our Passenger Traffic Issue

Mt. Kisco, N. Y.

To the Editor:

I have read with much interest the excellent articles on passenger traffic recovery in the *Railway Age* of November 30. There are one or two small suggestions which I would like to add.

One suggestion is the greater use of express trains. A long trip (of perhaps 25 miles or more) on a train which stops at all stations is undoubtedly a weary proceeding, and one which the average person does not undertake unless it is necessary; i.e., unless they have no private automobile at their disposal and there is no bus line.

Usually, on a suburban local train operating out of a large city, the great bulk of the passengers travel less than 25 miles, and even though some coaches may be dropped (with the attendant delay) at this point, the remainder of the train is but sparsely inhabited.

Would it not, then, be a good idea in such cases to run a single car as an express to the more distant stations on the line and run a local only about 25 miles and then turn it around? From the standpoint of the passengers, of course it would. From the standpoint of the railroad it would undoubtedly be more expensive principally on account of the additional labor. It will then be a matter of whether the running of two trains instead of one will attract sufficient passenger traffic to justify the additional expense. In this connection consideration should be given not only to the immediate effect on the traffic but also to the resulting attitude of the public. If people are allowed to become dissatisfied with the railroad they will use other means of transportation, and once these other means of transportation have won the passengers away from the railroad it will be hard indeed to change their habits to such an extent that they will want to ride the railroad again, rather than use it only when they have to.

The breaking up of a run into two (or perhaps more) trains in this way would not be justified everywhere, of course, but it does seem to me that a trial of the idea would be justified in many places now handled by a single, slow train.

There is another idea which seems to me to deserve consideration in meeting long-distance bus competition, and perhaps the competition from some private automobiles.

At present, to a very large extent, the high-class trains are operated only between important places, so that the small towns can not use them without first taking some other train, or bus, or automobile to the nearest large town at which the high-class train stops. If it is necessary to take the bus that far, why not stay in it and go right to the destination?—which idea also applies to the private automobile. Why not, then, make a few of the high-class trains available for the use of the people of smaller towns?

Suppose, for example, a high-class train is to be operated between two cities, say, 200 miles apart—or maybe two or three times that distance. By "high-class," in this case I mean a train having de luxe coaches, a Pullman car and, if conditions justify it, a buffet car where light lunches may be purchased at moderate rates. Such a train, when operated to secure the small town trade, could be stopped anywhere on signal but allowed to accept only tickets for 100 miles or more—the exact distance to be determined by experience and local conditions. This last provision is, of course, for the purpose of preventing the train from becoming an ordinary local or suburban train, especially when nearing or leaving large cities.

Such a train should be advertised as an express. The advertising might be by posters in the stations, announcing that an express to such and such important places, and intermediate points, will stop at this station at such a time on signal. Its time of arrival at important places might also be mentioned. The posters, in addition to being placed in the stations, might also be placed in various locations around the town, and the conveniences of the train could thus be brought to the attention of those who would be its customers. Residents of large cities would also use it, however, in going to small places some distance away, so some efforts should also be made to call the train to their attention—by newspaper advertisements or otherwise.

No fear need be felt that the train will make so many stops as to become, in effect, a way train. Should this condition develop the railroads should say, "Thank God!" as it would be an obvious indication that the service was being appreciated, and the remedy would be the addition of more trains of a similar character operating a more frequent service. The stops on any one train would then become less.

I have also had an idea for some time that a portion of the private automobile traffic could be brought back to the rails if the railroads could offer something in the way of group tickets. At present, if a man owns an automobile it is usually a toss-up whether it is cheaper for him to use it in making a contemplated trip or cheaper to go by train. If there is more than one person making the trip, however, the automobile nearly always wins from the standpoint of expense, because it can carry two at no appreciable increase in expense, while the expense by rail is double that for one. A group railroad ticket providing transportation at rates only slightly higher than the cost of operating an automobile should draw quite a few motorists who now travel by automobile solely for economy. Such tickets should be limited to about five people—the average automobile capacity—or perhaps only three or four. There will be an offsetting loss due to the fact that people who have to use the railroad anyway will form into groups to get the benefit of the group tickets. Unless there are some statistics available on the effect of such tickets it will require experimenting to determine their worth—or the lack of it.

In any event—more power to the railroads!

G. W. O'Connor.

Railroads Need Young Men

Pelham, N. Y.

To the Editor:

It is with interest that I read your recent article "Human Factor in Transportation," and in particular the statements made by Judge Fletcher.

As one who is seriously interested in the outcome of the present railroad situation, I must agree with Judge Fletcher that one thing the roads need today more than ever is young men and new blood. The radical changes that are taking place and the variety of existing competition should create a demand for keen business operators. Yet this huge industry is not very attractive to the young man who is beginning to make his way in the business world today. He does not have to go very far before he finds out that there are greater opportunities in other fields, particularly if he has any exceptional ability. The very railroad officials that he will talk to will discourage him, in most cases.

It so happens that the writer comes from a family of railroad people and has always had the greatest desire to be successful in the railroad field. Having made the personal acquaintance of men in various stages of the business (which includes one president, two vice-presidents, one general manager and two division superintendents), several attempts were made to enter the railroad field; with only one exception the answers from these same men were, "Keep away from the business," "You have a much better chance where you are," "I wouldn't let my own son go into this business," and other similar remarks.

I am an employer of men and needless to say it does not take long to spot the man who is sold on his job, not because pay day comes around every Friday, but because he is in love with his work. That is the man who gets the money and moves along, and he knows it, too. Where would that same man be in the railroad ranks? In all probability he wouldn't move very far, unless everybody moved, because the law of seniority rights

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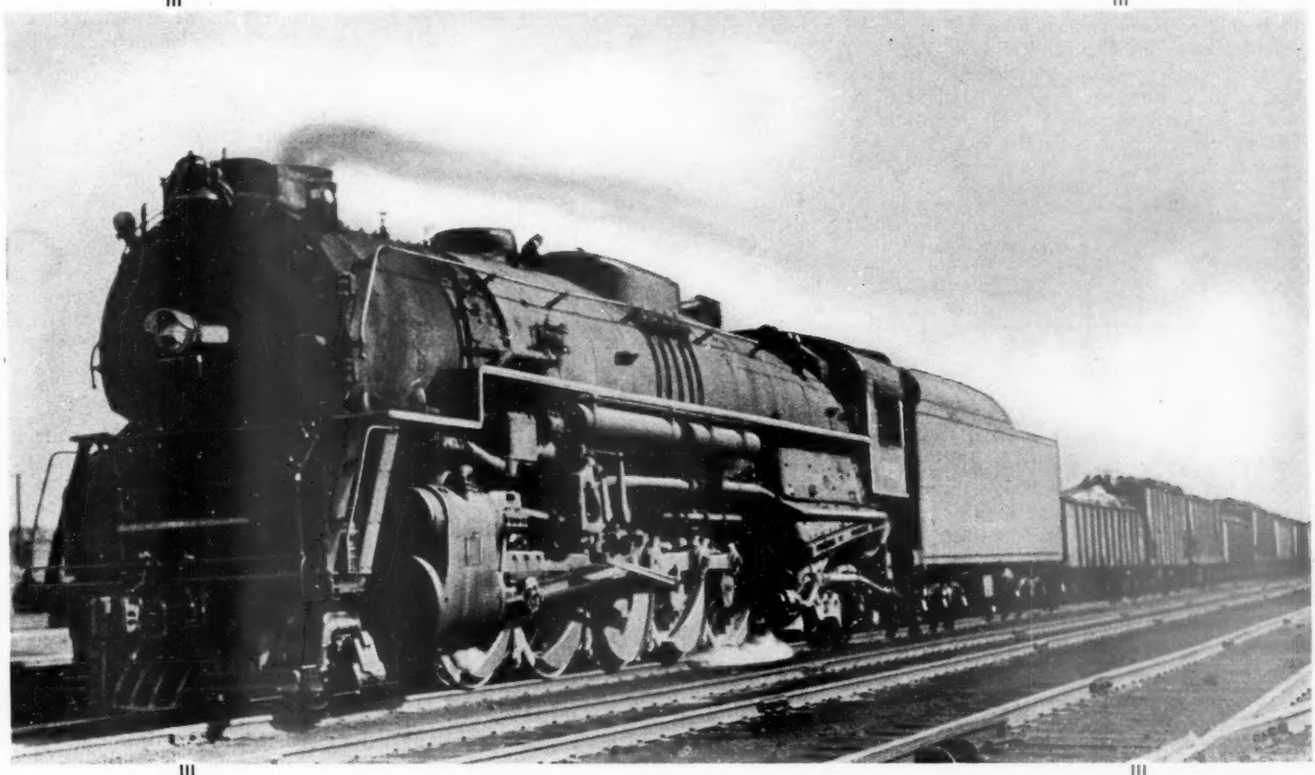
MORE TONNAGE MOVED FASTER



INCREASED NET EARNINGS

More ton-miles per train hour; more net tons per mile of road per day is the measure of the effectiveness of the transportation plant. « « « Modern steam locomotives set the pace for train movement—they move more tons at faster speeds and at lower costs—they speed up the transportation plant, and increase the net earnings of the entire railroad.

LIMA LOCOMOTIVE WORKS INCORPORATED, LIMA, OHIO

LIMA LOCOMOTIVE WORKS INCORPORATED

says that John Doe, who has been in the service two years longer, should have the job, regardless of the fact that it makes little or no difference to John Doe if he is working for the railroad or a banking institution, just so long as pay day comes around.

I firmly believe that the railroads have fallen into a rut as Judge Fletcher says, almost to the point where "it would be impossible for a young man of talent and of industry and of imagination and of initiative, or even of genius, to excel to such an extent that he may become an outstanding member of the body politic."

Certainly the railroad business holds the interest of countless young men throughout the country, many of whom are destined to be clever business men in some field. An example was the recent New York Central Railroad Wonder Trip, which ran on a day when New York experienced one of its worst rain, snow and wind storms, yet over 400 individuals paid $2.50 to make this trip. Why? To get a glimpse of a modern freight yard and to see locomotives in the various stages of repair. What other business could attract a crowd of this size in such weather?

The writer would appreciate the opinion of somebody else in this matter.

C. A. WARNER.

Music and Movies on Trains

LOS ANGELES, CAL.

TO THE EDITOR:

Many times while crossing the Continent, I have wondered why the trans-continental railroads make no effort to entertain their passengers. The railroads talk much about their speed and safety but unlike the steamship companies, they make no effort to entertain. The apparent relief on the faces of trans-continental rail passengers when they arrive at destination is in contrast to the often expressed wish on the part of disembarking steamship passengers that they were going further.

I have no solution for overcoming the boredom of trans-continental trips, but I believe relief would be afforded if club cars were given the atmosphere of a cocktail lounge with a bar and music which, although of the canned order, would be as effective as is found in many cafes. Then at night a movie.

I realize my suggestion is not novel and presume the railroads have given similar ideas consideration. The fact that such comforts are not available causes me to guess that railway officers have the mistaken idea that all passengers desire quietness and privacy. The above suggestion still permits such privacy to those not electing to make use of the club car features.

F. P. HARRIS.

High Speed and Safety

FONTANA, CALIF.

TO THE EDITOR:

Among the numerous problems discussed in the *Railway Age* for November 30, it was stimulating to notice that the question of high speed—and its relation to safety records—was given consideration. The editorial comment reminds us not to forget the outstanding safety records set up by the rail lines, and asks what would be the public reaction if the new speed should destroy previous safety attainments?

High speed—it must be encouraged. And ample safety—it must be retained. That double accomplishment may seem difficult. Yet, the greater rate of speed is necessary in building up the passenger traffic. Likewise, the attractiveness of abundant safety is an important factor in keeping the traffic secured through speed.

No doubt the operating men have a fancy job to perform. But they can do it if they will make full use of their tools. The motive power is now available. The private right-of-way, *properly maintained,* is certainly a speed channel. Automatic train control and the other devices have helped produce the finest railway plant in history. Now is the time to test that plant to the fullest extent.

H. C. TIMMONDS.

Odds and Ends . . .

Largest Railway Passenger?

Recently we told of a 600-lb. woman who was a passenger on a Frisco passenger train. The Norfolk & Western has responded to this by producing a passenger weighing 627 lb. in the person of Sam Harr of Pocomoke City, Md. Mr. Harr has a 78-in. waistline and is 5 ft. 7 in. tall and 6½ ft. around.

Another Record

To the French railways goes a record of which they can hardly be proud. In a recent boiler explosion on the locomotive of a passenger train at Tenay-Hautville, the running gear was left on the track, while the rest of the engine was blown into a cornfield exactly 1,738 ft. away. This must be a long distance record for boiler explosions.

Station Decoration

There may be larger and newer stations than the Union station in Nashville, Tenn., but this station has one claim to fame that should not be overlooked. Its train shed contains more colored glass than that of any other station in the country. There must be literally acres of colored glass in the huge arched windows at the north end of the train shed.

Railroad Men Mourn Sadie, the Station Dog

Railroad men filed sadly past a tiny coffin lying in state at the Union station at St. Joseph, Mo., recently. Sadie, the station dog, was dead. Sadie ran away from a good home 11 years ago and thereafter refused to have anything to do with anyone but railroad men. She could pick one out in a crowd. When the first streamlined train went through St. Joseph, Sadie was an honored guest aboard. The dog will be buried in a flower garden at the station. Six two-day old puppies survive.

Perhaps Cars Will Be of Steel

A 65 year old copy of the Official Guide recently dug up contains the following prediction: "The time is not far distant, probably, when passenger cars will be made of iron or steel and that without any increase of the non-paying weight. The iron car will have the advantage that it cannot be burned and the passengers cannot be transfixed with splinters in case of collision. There have already been one or two iron passenger cars built in this country, but they were crude in design and not looked upon favorably either by managers or by the public."

Warning! A Fish Story

George Stamets is a section foreman for the Pennsylvania and to him goes the palm for the best fish story of the year. It appears, if we are to believe George, that he was riding along the railroad in a track motor car near Milford, N. J., when he saw a fish hawk flying along with a shad in its talons. Thereupon, he made the motor backfire, the startled hawk dropped the fish upon the right of way and Stamets walked over and picked it up and used it for his supper. Despite Mr. Stamets' well-known reputation for always telling the truth, it is unlikely that track motor car manufacturers will use this in their advertisements as an additional feature of their product.

Pigeon Specials

It has been established that between May and September more than 10,000,000 pigeon journeys will be made by rail in England. The transport arrangements involved for the movement of this traffic are so comprehensive that an 80-page booklet has been prepared by the L. M. S. dealing with the birds' transport. This season's plans cover the activities of 104 pigeon racing organizations, of which 43 are located in Lancashire and 15 in Scotland, the remainder being in Yorkshire, the Midlands, the West of England and a few in the South. Apart from baskets of birds conveyed in the ordinary guard's vans, no fewer than 2,458 vans will be specially provided by the L. M. S. during the season, to carry nothing but pigeon traffic.

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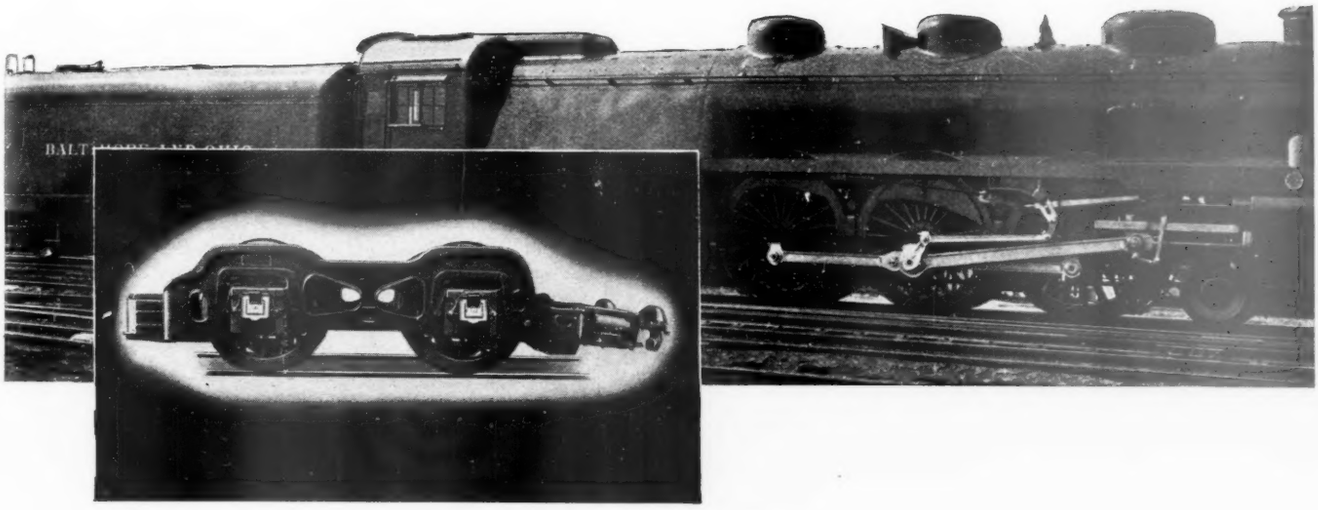
AN INTEGRAL PART...



...OF BALANCED POWER

Idle weight and spare steam are capitalized by The Locomotive Booster. The Booster is a Power Unit—not a specialty.

It is an integral part of any locomotive design that develops maximum capacity with minimum weight.

It provides the extra tractive effort needed for starting, accelerating and tight places, and avoids the need of a lot of excess weight that is used but a small part of the time, but that must be hauled around and maintained all the time.

The modern Booster locomotive is a more efficient and economical locomotive and one that costs far less for maintenance.

No locomotive device is better than the replacement part used for maintenance. Genuine Franklin repair parts assure accuracy of fit and reliability of performance.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

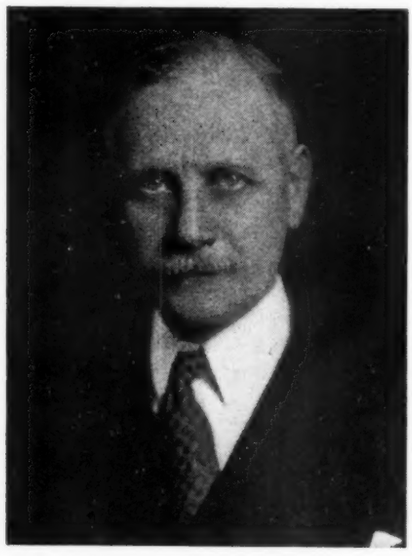
NEW YORK CHICAGO MONTREAL

NEWS

Hammond Succeeds Todd on Bangor & Aroostook

Chairman of Maine road's executive committee is elected also to the presidency

John Henry Hammond, chairman of the executive committee of the Bangor & Aroostook since 1920, has also been elected president to succeed the late Percy R. Todd, who died on October 23. Mr. Hammond, who is a member of the New York law firm of Hines, Rearick, Dorr & Hammond, of which the late Walker D. Hines, director general of railroads during the World War, was senior partner, has previously served as acting president of the Bangor &



John Henry Hammond

Aroostook Railroad Company from 1918 to 1920, during the period of federal control. He will continue to maintain his headquarters at New York.

Mr. Hammond was born in Louisville, Ky., on October 3, 1871, and was educated at Phillips-Exeter Academy and Sheffield Scientific School, Yale University, from which he was graduated in 1892 with a Ph. B. degree. He received his Bachelor of Laws degree from Columbia University in 1895; in the same year he was admitted to the bar and began the practice of law. During 1896 Mr. Hammond served as assistant solicitor for the Erie and from 1899 to 1901 he was deputy attorney general of New York State. In 1909 he joined the law firm of Cadwalader, Wickersham & Taft, remaining a partner there until 1916 when he became a member of the banking firm of Brown Brothers & Co. (now Brown Brothers, Harriman & Co.). Mr. Hammond continued with Brown Brothers until 1930, during which time he also served his 1918-1920 term as acting president of the Bangor & Aroostook, and from 1923 to 1925 as vice-president and chairman of the executive committee of the Cincinnati, Indianapolis & Western. Since 1930 he has been a member of the firm of Hines, Rearick, Dorr & Hammond.

Mr. Hammond served during 1917-1918 as director of the Bureau of Enemy Trade, War Trade Board, and is the author of "Hammond on Taxation of Business Corporations in New York State" (1901).

A photograph of the late Percy R. Todd, together with a sketch of his railway career appeared in the *Railway Age* of November 2, page 575.

Mid-West Shippers' Board

The annual meeting of the Mid-West Shippers' Advisory Board will be held on January 9 at the Palmer House, Chicago. The election of officers for 1936 will take place, and the usual forecasts of carloadings for the first quarter of the year will be presented.

H. C. Davis, I.C.C. Examiner, Dies

Haskell C. Davis, attorney-examiner of the Interstate Commerce Commission since 1921, died at Washington, D. C., on December 20. For several years he had been chief of the convenience and necessity section of the commission's Bureau of Finance.

Commissioners Aitchison and Porter to be Reappointed

President Roosevelt has announced his intention to re-appoint for another term Commissioners Clyde B. Aitchison and Claude R. Porter of the Interstate Commerce Commission whose terms expire on December 31. Mr. Aitchinson has been a member of the commission since 1917 and Mr. Porter since 1928.

Sloan Optimistic on 1936

The Missouri-Kansas-Texas is now enjoying "a heavier movement of high class commodities than they have had in several years" according to the statement made by Matthew S. Sloan, chairman and president, at a meeting of the M.K.T. board of directors in New York on December 19. Mr. Sloan pointed out that the Katy's November revenues were 25 per cent greater than in November, 1934, and that "December revenue is running 24 per cent ahead of last year." It is his prediction that the increase should continue "well into 1936."

A. A. R. Board Authorizes Air-Conditioning Study

Thorough survey of all systems to be conducted by Equipment Research division

A thorough study of the various systems now in use by the railroads for the air-conditioning of passenger cars is to be made by the Association of American Railroads, J. J. Pelley, president of that Association, has announced. Under authority of the board of directors, the study will be conducted under the direction of L. W. Wallace, director of the Equipment Research Division.

While practically all the principal railroads of this country, as well as the Pullman Company, are making use of air-conditioning devices for passenger equipment, the systems vary, and it is the purpose of this study to determine the relative efficiency and economy of the various types and whether the air conditions being obtained in the cars are satisfactory from the standpoint of the comfort and well being of the passengers. At the present time there are three basic types of air-conditioning equipment being used by the railroads, although there are numerous variations of each type. The three basic types are ice, steam and mechanical compressor, in the first two of which water is used as the refrigerant. In the compressor type, however, certain kinds of gas are used as the refrigerant.

"Air conditioning of passenger equipment," said Mr. Pelley, "is of such fundamental importance to American railroads and is such a new development so far as the rail carriers are concerned that the board of directors has determined on a comprehensive research program being conducted into that subject. What the railroads want to know is what type or types are best adapted for railroad use, whether there are any improvements that can be made, which type provides the greatest comfort to the public, and which are the most economical to install and operate. Railroad managements also want to know whether some system or systems can be developed in the light of experience which the railroads have had in recent years whereby some standardization can be brought about whereby the cost of installation and upkeep can be reduced.

"Air conditioning of passenger cars is recognized by the railroads as an improvement that will eventually be in common use on railroads throughout the country. In view of the fact that in recent years the railroads have had an opportunity to experiment with and make use of various sys-

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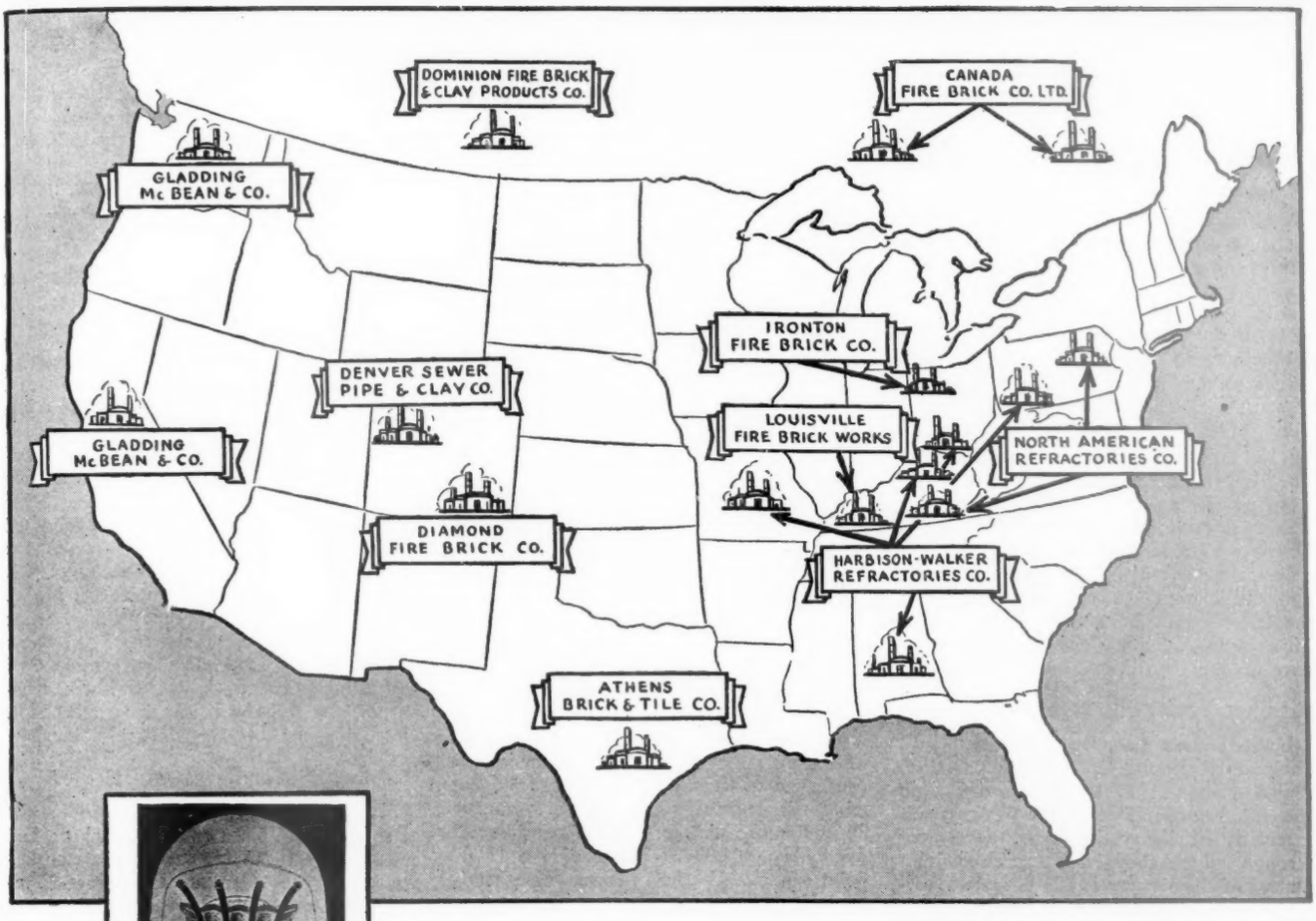
DOMINION FIRE BRICK & CLAY PRODUCTS CO.
CANADA FIRE BRICK CO. LTD.
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IRONTON FIRE BRICK CO.
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GLADDING McBEAN & CO.
NORTH AMERICAN REFRACTORIES CO.
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ATHENS BRICK & TILE CO.

"Security Arch" Supply *Safeguards* Locomotive Service

The ready availability of Security Brick, at many plants conveniently located to serve the railroads, guarantees against needless delay in Arch maintenance.

How carefully the interests of the railroads have been safeguarded is indicated by the supply sources shown on the map above.

AMERICAN ARCH COMPANY

INCORPORATED

Locomotive Combustion Specialists

NEW YORK CHICAGO

tems from a practical standpoint, the board of directors feels that a complete study at this time should bring about the development of a still greater improvement in air conditioning of passenger cars."

Bardo Trustee of Electric Line

Clinton L. Bardo, until recently president of the New York Shipbuilding Company and prior to 1925 general manager of the New York, New Haven & Hartford, has been named trustee of the New York, Westchester & Boston by the federal court for Connecticut. The Westchester line is a rapid transit electrified subsidiary of the New Haven.

K.C.S. Complaint Dismissed

The Interstate Commerce Commission has dismissed a complaint filed by the Kansas City Southern against the Louisiana & Arkansas and the Louisiana, Arkansas & Texas with a finding that their failure to deliver loaded and empty cars destined to and for interchange with complainant at the latter's Harriet avenue train yard in Shreveport, La., has not been shown to have been unlawful.

Dissolve Voting Trust of Rio Grande

United States Circuit Judge Charles B. Faris at St. Louis, Mo., on December 19, denied a request of the Missouri Pacific and the Western Pacific for a two-years extension of the voting trust agreement through which they have exercised joint control of the Denver & Rio Grande Western. This leaves power of administration at the discretion of the Railroad Credit Corporation and the Reconstruction Finance Corporation, each of which holds half of the Rio Grande's 300,000 shares of common stock as collaterial for loans to the two parent roads.

Railroad Credit Corporation

E. G. Buckland, president of The Railroad Credit Corporation, has announced that the Corporation will make a liquidating distribution on December 31 of $735,885, or 1 per cent, to participating carriers. This will be the twenty-third of such distributions and will bring the total to $29,435,398, or 40 per cent of the fund administered by the Railroad Credit Corporation under the terms of the Marshalling and Distributing Plan, 1931. Of the total amount returned to the carriers $13,593,657 will have been paid in cash and $15,841,741 credited on carriers' indebtedness to the corporation.

Militant Employees Will Bring Fair Deal for Roads, Says Needles

"A survey of economic conditions in 1935 shows a moderate, but general, improvement in business conditions throughout the country," A. C. Needles, president of the Norfolk & Western, says in his annual Christmas and New Year message to employees. The upward trend, he adds, is reflected in the railroad's traffic.

"Despite these encouraging signs," the rail executive says, "the N. & W. and other railroads of the nation, together with all of their employees, will enter the New Year faced with many serious problems." Mr. Needles warns the rail workers, "the future of your railroad and of your job is challenged by a subsidized, destructive and unfair competition; by restrictive legislation; and by the threat of government ownership."

Pointing out that the employees of the railroad "accepted that challenge by the adoption of a militant program" at their last annual Better Service Conference, the N. & W. president asserts that "the next and most important step is translating that program into action. This means better service to our patrons; better citizenship by qualifying and voting for those candidates for public office who will fight to give the railroads a square deal; and informing yourselves on railroad problems and broadcasting the facts throughout your communities. Vigorously carried out, this program should bring definite and beneficial results in the year to come."

Southwest Lines Extend Pick-Up and Delivery

Railroads in the southwestern territory will, on January 20, place free pick-up and delivery service in effect in that territory to supplement the present plan under which certain freight shipments are given pick-up and delivery service without an additional charge and others are handled at a charge of 10 cents per 100 lb. The action of the southwestern lines was precipitated by that of the western lines, which, on January 20, will make pick-up and delivery service available at 9,000 to 10,000 of the 13,000 points in the Western Trunk Line territory.

Pension Commission Holds Hearings

The special investigation commission recently appointed under the provisions of the railroad retirement act to make a "thorough investigation" and hold hearings regarding desirable provisions of a "sound" retirement and annuity system for railroad employees held a closed session at the Interstate Commerce Commission building in Washington last week and heard statements by D. B. Robertson, president of the Brotherhood of Locomotive Firemen and Enginemen, and Murray Latimer, chairman of the Railroad Retirement Board. Under the law the board is expected to report to the President and Congress by January 1.

Slason Thompson Dies

Slason Thompson, who founded the Bureau of Railway News and Statistics, Chicago, in 1904 and served as its director until his retirement in May, 1935, died on December 22 at his home in Lake Forest (Chicago) at the age of 87 years. Mr. Thompson was born on January 4, 1849, in New Brunswick and was educated at the University of New Brunswick. Early in his career he became a member of the bar of New Brunswick and later that of California. In 1874 Mr. Thompson entered newspaper work and served successively with the San Francisco Call and Evening Bulletin and the New York Tribune, being appointed western agent for the New York Associated Press in 1879. In 1881 he was one of the founders of the Chicago Herald and later served as an editorial writer for the Chicago Morning News, the Chicago Evening Journal and the Times-Herald. In 1903 Mr. Thompson was appointed press representative for the Railway Managers' Association, and in the following year he established and became director of the Bureau of Railway News and Statistics, in which capacity he remained until his retirement in May of this year. Mr. Thompson was the author of a number of books on railway matters.

Committee to Confer with Labor on Protection of Displaced Employees

The board of directors of the Association of American Railroads, at a meeting in Washington on December 20, considered the proposal of a committee of the Railway Labor Executives' Association appointed to confer with representatives of the railroads managements on the question of the protection of the interests of the employees in connection with consolidated or co-ordination projects and appointed a committee for the purpose as follows: J. J. Pelley, president of the association; M. W. Clement, president of the Pennsylvania; F. E. Williamson, president of the New York Central; L. A. Downs, president of the Illinois Central; L. W. Baldwin, trustee of the Missouri Pacific; and C. R. Gray, president of the Union Pacific.

Revision of Rates on Textiles

An extensive revision of railroad freight rates on cotton piece goods, dry goods, and cotton and knitting factory products is prescribed by the Interstate Commerce Commission in a voluminous report made public last week in a proceeding involving tariffs proposed by the railroads and suspended by the commission, with which were consolidated several complaint cases, involving a controversy which has been in effect for many years as to the rate relationship on such products from New England and the South. Classification ratings were in general found not in excess of maximum reasonable bases but the commission has prescribed maximum reasonable rates to take the place of the present or proposed rates as to much of the traffic. Commissioners Lee, Caskie, Mahaffie, and Miller dissented in part.

Club Meetings

The Indianapolis (Ind.) Car Inspection Association will hold its next meeting at Hotel Severin, Indianapolis, on Monday evening, January 6.

The Car Foreman's Association of Chicago will hold its next meeting at the LaSalle Hotel, Chicago, on Monday evening, January 13. The discussion will be on the revised A.A.R. rules of interchange.

The Western Railway Club will hold its next meeting at Hotel Sherman, Chicago, on Monday evening, January 20. W. W. Colpitts, of New York, will speak on public reaction to high-speed trains. Preceding the address, there will be a dinner at 6:30 p. m.

The Pacific Railway Club will hold its next meeting at the Key System Auditorium, 2129 Grove Street, Oakland, Calif., on Thursday evening, January 9. The subject of welding will be discussed by C. A. Daley of the Air Reduction Sales Company and Frank Longo, supervisor of

Continued on next left-hand page

THE SUPERHEATER COMPANY

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welding in the Southern Pacific shops at Los Angeles; and there will be illustrated talks on various systems of welding.

The Washington, (D. C.) Transportation Club at its annual business meeting on December 19 elected officers for the coming year as follows: President, Louis H. Curry, Capital Transit Company; first vice-president, G. Murray Campbell, assistant general freight agent, Baltimore & Ohio; second vice-president, secretary and treasurer, C. W. Nickless, freight and passenger agent, Norfolk & Western.

Western Maryland Improves Safety Record

Charles W. Brown, president of the Western Maryland, in his annual Christmas message, congratulated employees on their 1935 safety record which brought a reduction of approximately 57 per cent in the W.M. accident ratio as compared with 1934. Mr. Brown pointed out that during 1935 the safety organization was placed upon a staff basis with "gratifying results," adding that a 20 per cent reduction in 1936 under 1935 would bring the ratio down to approximately the average casualty ratio of all the railroads in the United States. He would like, however, "to set a goal of a 25 per cent reduction in 1936." The maintenance of way department made the best 1935 showing with a reduction of 90 per cent in personal injuries, as compared with 1934.

Railroads Represented on Safety Committee

At the National Accident Prevention Conference held at Washington on December 18 at the call of Secretary Roper of the Department of Commerce the Committee on Co-operation with Common Carriers, of which W. A. Harriman, chairman of the Union Pacific had been appointed chairman, voted to recommend changing its name to the Committee on Co-operation For Safety Among Commercial Carriers by Rail and Highway. After full discussion a sub-committee was appointed to draft a program for the committee and a plan for effectively carrying it out, to be presented at the next meeting of the committee, to be held shortly. Julius H. Parmelee, director of the Bureau of Railway Economics, represents the steam railroads on the sub-committee, which also includes representatives of the electric railways and the truck and bus associations.

Southern Pacific 1936 Budget

The maintenance budget of the Southern Pacific and its principal subsidiaries for road and equipment during 1936 will be $55,555,000 as now forecast, and as approved by the executive committee on December 18. This is an increase of approximately $5,400,000 as compared with 1935 and does not include additions and betterments to properties. In connection with the budget, so far as now determined, the expenditures for capital account will be $13,180,000, or an increase of $6,464,000 over 1935.

The road's program of air conditioning all its principal trains will be completed in 1936, involving over $1,100,000 expenditure in connection with work on the S. P.'s own equipment. In addition it will join the Pullman Company in carrying an expenditure of about $1,000,000 for air conditioning of sleeping cars. Increased allowance is being made for the maintenance of freight equipment.

Southern Pacific officers are studying the results currently derived from the experimental streamline service and from innovations in power, but as yet, the statement says, "we have not determined upon a program as an outcome of these experiments by other lines; except that there is a tentative understanding between our company and the Union Pacific and Chicago & North Western, under which a two-night-and-one-day streamline train service will be established between San Francisco and Chicago next Spring, probably in April."

A.A.R. Provides for Handling Recommendations of Shippers Boards

In response to a resolution adopted at a meeting of the Shippers' Regional Advisory Boards at Chicago on November 19, the board of directors of the Association of American Railroads has adopted the following resolution which had been approved by the Traffic Advisory Committee of the association:

Whereas, the Board of Directors has given consideration to the resolution passed at the general meeting of the Advisory Board Chairmen in Chicago on November 19th, in connection with matters of mutual interest, and particularly with respect to the handling of various subjects not directly connected with car service matters; and

Whereas, the Board of Directors, on behalf of the railroads, solicits and welcomes suggestions from the members of the Advisory Boards for improvements and betterments in transportation service, it being generally recognized that questions of rate and rate levels are most controversial as between individuals, industrial concerns and communities, and that they may only be properly handled through the established rate associations of the railroads; now, therefore, in order that the position of the railroads may be clarified and understood It is hereby declared:

1. That subjects of mutual interest to be discussed between members of the Advisory Boards and the railroads, other than individual rates and rate levels, should be restricted only by such rules of procedure as each Board may establish for itself; and

2. Whenever an Advisory Board considers and acts on matters within the aforesaid limitations which are of such nature that they can not be disposed of locally through the railroads or the contact committee on such Board, they may be referred through the District Manager to the proper officer of the railroad committee of the territory affected or to the proper officer of the Association of American Railroads as the Shippers' Advisory Board may elect.

The resolution adopted at Chicago, which was referred to, said that there was no present plan for handling many of the questions that are submitted by the shippers' boards and asked the association to set up an organization that would be empowered to act promptly and render decisions within a reasonable time on all questions submitted by the shippers' boards. The resolution had also declared that the shippers' boards should have the right to appeal from the decisions of such organization to the president of the association.

Equipment and Supplies

LOCOMOTIVES

THE PEORIA & PEKIN UNION has ordered one Diesel-electric switching locomotive from the American Locomotive Company. This locomotive will be equipped with General Electric electrical equipment and McIntosh & Seymour power plant.

FREIGHT CARS

THE ALUMINUM ORE COMPANY is inquiring for 22 covered hopper cars of 70 tons' capacity.

THE ATCHISON, TOPEKA & SANTA FE is inquiring for 500 box cars of 50 tons' capacity and 50 hopper cars of 70 tons' capacity.

IRON AND STEEL

THE MICHIGAN CENTRAL has ordered 725 tons of structural steel for a bridge at Wyandotte, Mich., from the Wisconsin Bridge & Iron Company.

NEW YORK CENTRAL.—This company has applied to the Public Works Administration for a loan of $2,593,000 for the purchase and laying of 35,000 tons of rail and other track material.

THE SOUTHERN PACIFIC has called for bids for about 40,769 gross tons of new rail with the necessary fastenings, making a total of about 50,000 tons. In 1936 the company plans to lay 220 miles of new rail and in 1935 just closing the company is laying 143 miles.

Supply Trade

The Republic Steel Corporation will move its Cleveland, Ohio, district sales office on December 30, from Union Trust building to 920 Republic building. **W. E. Collier** continues in charge of the office as district sales manager.

Effective January 1 the business formerly conducted by three **Bethlehem Steel Corporation** subsidiaries, the **McClintic-Marshall Corporation,** the **Pacific Coast Steel Corporation** and the **Kalman Steel Corporation,** will in future be conducted by the **Bethlehem Steel Company.**

Continued on next left-hand page

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MERRY CHRISTMAS
HAPPY NEW YEAR

AMERICAN LOCOMOTIVE COMPANY

ALCO

30 CHURCH STREET NEW YORK N.Y.

Financial

DENVER & RIO GRANDE WESTERN.—*Receivership.*—The Chase National Bank, New York, filed a suit in the United States district court at Denver, Colo., on December 17, as trustee for the refunding and improvement mortgage dated April 1, 1924, asking for an order impounding income from certain properties of the railroad, for leave to intervene in the reorganization and seeking other relief. The suit states that the interest on the bonds that is due now amounts to more than $1,250,000, and the Chase National Bank is petitioning the court for leave to intervene to protect its rights. It asks for an accounting of all properties and also requests that the refunding mortgage be decreed a valid and subsisting lien and that its priority be declared valid. The petitioner also asks that all the incomes from the property covered by the lien be segregated and allocated for the benefit of the mortgage holder.

ILLINOIS CENTRAL.—*R. F. C. Offers Loan at 4 Per cent.*—Carrying out the policy of using government competition as a means of forcing down interest rates Chairman Jones of the Reconstruction Finance Corporation has offered to increase its loans to this company to $25,000,000, due July 1, 1941, at 4 per cent, covering the company's present indebtedness to the R.F.C. of $17,555,333 and an issue of $8,000,000 of 6½ per cent notes maturing on July 1, if additional collateral is furnished. In a letter to President L. A. Downs making the offer he said that if the railroad should be able to arrange private financing on approximately as good a basis "it will be satisfactory to this corporation for you to do so." Mr. Jones also commented "with interest" on statements in a letter from Mr. Downs to him that the road had ample cash working balances and reserves to meet interest payments early in 1936 and that, while it would not quite earn its charges in 1935 its cash would be increased. He also expressed gratification that the company had reduced its outstanding obligations by $2,500,000 since 1929 and had reduced its fixed charges by about $500,000 a year.

LOUISVILLE & NASHVILLE.—*New Director.*—Menifee Virgman has been elected a director of this company to succeed the late Attilla Cox.

MISSOURI PACIFIC.—*Hearing on Reorganization Plan.*—The Interstate Commerce Commission has announced a hearing to be held at Washington on February 4 before Director Sweet of its Bureau of Finance on the reorganization plan filed by the Missouri Pacific, New Orleans, Texas & Mexico, and the International-Great Northern, or any other plan that may be presented.

NEW YORK, NEW HAVEN & HARTFORD.—*Salaries of Trustees.*—The Interstate Commerce Commission, Division 4, has issued an order fixing the maximum compensation to be paid to the trustees as $30,000 per annum for H. S. Palmer, president of the company, and $12,500 for W. M. Daniels and James Lee Loomis. The maximum for W. W. Meyer, counsel for the trustees, was placed at $15,000.

PENNSYLVANIA.—*Equipment Trust Certificates.*—This company has applied to the Interstate Commerce Commission for authority to assume obligation and liability in respect of an issue of $18,420,000 of 2¼ per cent equipment trust certificates.

PENNSYLVANIA.—*Trackage.*—This company has applied to the Interstate Commerce Commission for authority to operate under trackage rights over the Wheeling & Lake Erie to a mine near Glen Dun, Ohio, 10 miles.

PENNSYLVANIA.—*P.W.A. Loan.*—The Reconstruction Finance Corporation has purchased from the Public Works Administration and has called for bids on January 9 on $30,800,000 of the road's secured 4 per cent serial bonds issued in connection with a loan for the New York-Washington electrification.

ST. JOSEPH & GRAND ISLAND.—*Dividends.*—The directors of this company have declared a dividend of $4 on the 5 per cent first preferred stock and $4 on the 4 per cent preferred stock, completing the dividend requirements on both issues for the year; and in addition have declared a dividend of $2 on the common stock.

Average Prices of Stocks and of Bonds

	Dec. 24	Last week	Last year
Average price of 20 representative railway stocks..	40.66	40.96	35.15
Average price of 20 representative railway bonds..	75.50	75.38	74.81

Construction

CHESAPEAKE & OHIO.—This road will ask for bids early in January to revise line in open cut and retire present line including Triplett Tunnel, at Haldeman, Ky., to cost about $444,000.

DELAWARE & HUDSON.—The New York Public Service Commission has amended its order for the elimination of the grade crossings of this road in Bainbridge, N. Y., so as to leave the Walnut avenue, the Johnson street and the West Main street crossings open to traffic. The amended order now approved provides that an undercrossing be constructed under the tracks at a point about 977 ft. northeast of the present Freiot avenue crossing with a highway connection to North Main street and to Guilford road. This will provide for the elmination of Guilford road, Freiot avenue, Scott street and Tyler street crosings which will be closed.

NEW YORK CENTRAL.—The New York Public Service Commission has approved a revised general plan together with specifications and an estimate of cost of $304,100, exclusive of land and property damages, for the elimination of this road's grade crossings at Carman in the town of Rotterdam, N. Y.

Railway Officers

FINANCIAL, LEGAL AND ACCOUNTING

Changes in Union Pacific's Legal and Accounting Departments

Coincident with the unification of the Union Pacific System on January 1, through the lease of all the other units to the Union Pacific Railroad, the personnel of the accounting department will be consolidated, with headquarters at Omaha, and, in addition, a number of changes will be made in the personnel of the legal department.

In the accounting department H. A. Toland remains as general auditor; C. J. Merriam, auditor of the Union Pacific Railroad, becomes assistant general auditor, R. Wipprecht, auditor of the Oregon Short Line at Salt Lake City, Utah, has been appointed assistant to the general auditor; and H. S. Walker remain as assistant to the general auditor. Heads of the various auditing sub-divisions have been appointed as follows: W. S. Ure, assistant treasurer of the Oregon Short Line at Salt Lake City, as auditor of station accounts; F. J. Krecek, assistant auditor of the Oregon Short Line at Salt Lake City, as assistant auditor of disbursements; and E. J. Doolin, assistant auditor of the Union Pacific Railroad, as auditor of equipment service accounts. The following officers will retain their previous titles: J. K. Finlayson, auditor of miscellaneous accounts; B. Lancaster, auditor of disbursements; G. W. Streicher, auditor of freight accounts; H. J. Peterson, assistant auditor of freight accounts; and I. H. Ochiltree, auditor of passenger accounts.

In the legal department J. M. Souby, commerce counsel of the Union Pacific System, has been appointed to the newly-created position of western general counsel. The position of commerce counsel is abolished, although Mr. Souby retains jurisdiction over all Interstate Commerce Commission work. Other changes in the legal staff at Omaha include the appointment of Thomas W. Bockes, Dana T. Smith and John A. Bennewitz, each as assistant western general counsel; Thomas B. Mathhai as general attorney; Thomas F. Hamer as general attorney for Nebraska and Iowa; Stanfield Johnson and Walter A. Rouse as assistant general attorneys; and George C. Holdredge as assistant general attorney for Nebraska and Iowa. Heretofore Mr. Bokes has been general attorney for Nebraska and Iowa. Mr. Smith has been assistant commerce counsel, Mr. Bennewitz has been general attorney, Mr. Matthai and Mr. Hammer have been assistant general attorneys for Nebraska and Iowa, Mr. Johnson has been assistant to the commerce counsel, and Mr. Rouse and Mr. Holdredge have been attorneys.

The following officers will retain their present titles with the jurisdiction indicated: Charles A. Magaw, general solicitor for the Union Pacific Railroad at

Continued on next left-hand page

"Neither Rain, Nor Snow, Nor Heat, Nor Gloom of Night . . "

Trains will not be delayed nor schedules disrupted by rain, snow, sleet or fog, if locomotives are equipped with "Union" Coded Continuous Cab Signals. These signals ride in the cab where nothing can obstruct their view.

Accelerated and safe operation, are but two of the many good reasons why you should install "Union" Coded Continuous Cab Signals. Shall we tell you about the others? Consult our nearest district office.

Union Switch & Signal Co.

SWISSVALE, PA.

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NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

Omaha, with jurisdiction in Nebraska, Kansas, Iowa, Missouri, Colorado and Wyoming; Arthur C. Spencer, general solicitor of the Oregon-Washington, R.R. and Navigation Company at Portland, Ore., with jurisdiction in Oregon, Washington and Northern Idaho; and George H. Smith, general solicitor of the Oregon Short Line at Salt Lake City, with jurisdiction in Utah, Northern Nevada, Southern Idaho and Montana. In addition, Edward E. Bennett, general attorney for the Los Angeles & Salt Lake at Los Angeles, Cal., has been appointed general solicitor with jurisdiction in California and Southern Nevada.

OPERATING

J. R. Derrick, assistant superintendent of the Pocahontas division of the Norfolk & Western, with headquarters at Bluefield, W. Va., has been appointed assistant to the general manager, succeeding **W. R. Dawson,** who will retire on January 1. **F. L. Burton,** roadmaster of the Radford division, with headquarters at Roanoke, Va., has been appointed assistant superintendent of the Pocahontas division at Bluefield.

Felix R. Gerard, superintendent of the Philadelphia division of the Pennsylvania, with headquarters at Harrisburg, Pa., has been promoted to general superintendent of

Felix R. Gerard

the Nortwestern division, with headquarters at Chicago, succeeding **John L. Gressitt,** who has been appointed acting chief engineer maintenance of way of the Western region. **W. D. Supplee,** division engineer of the Philadelphia Terminal division, has been appointed superintendent of the Logansport division, with headquarters at Logansport, Ind., to succeed **F. R. Rex,** who has been transferred to the Chicago Terminal division, where he replaces **Frank W. Stoops,** who goes to Harrisburg to succeed Mr. Gerard.

Mr. Gerard has been connected with the Pennsylvania for more than 32 years. He was born on August 30, 1887, at Blairsville, Pa., and obtained a correspondence school education. He entered the service of the Pennsylvania in the engineering department in May, 1903, and from 1907 to 1920, he occupied various positions in the transportation and operating departments of this road. In the latter year Mr. Gerard was appointed assistant freight trainmaster on the Pittsburgh Terminal division, and two years later he was made freight and passenger assistant trainmaster on the Conemaugh division. He was promoted to passenger trainmaster on the Philadelphia division in 1926, and was subsequently transferred to the New York division. In 1928 Mr. Gerard was promoted to superintendent of the Long Island, being transferred in 1931 to the Philadelphia division, with headquarters at Harrisburg, where he was located at the time of his recent appointment.

TRAFFIC

D. T. Daily has been appointed industrial agent of the Seaboard Air Line, with headquarters at Norfolk, Va.

ENGINEERING AND SIGNALING

John L. Gressitt, general superintendent of the Northwestern division of the Pennsylvania, with headquarters at Chicago, has been appointed acting chief engineer maintenance of way of the Western region, with the same headquarters, succeeding **Porter Allen,** who has been granted a leave of absence because of ill health.

B. R. Kulp, principal assistant engineer of the Chicago & North Western, has been appointed engineer maintenance of way, with headquarters at Chicago, effective January 1, succeeding **J. A. Peabody,** who will retire on that date at his own request on account of ill health. **Don C. Barrett,** supervisor of bridges and buildings of the Madison division, with headquarters at Winona, Minn., has been promoted to division engineer of the Black Hills division, effective January 1, replacing **C. H. Wells,** who has been transferred to the Iowa division, with headquarters at Boone, Iowa, replacing **M. E. Thomas,** who will retire under the pension rules of the company.

PURCHASES AND STORES

F. P. Dugan, assistant chief clerk in the purchasing department of the Illinois Central at Chicago, has been appointed acting division storekeeper, Markham storehouse (Chicago), succeeding **J. G. Warnecke,** who has been granted a leave of absence.

OBITUARY

C. W. Pidcock, president of the Georgia Northern, with headquarters at Moultrie, Ga., died on December 18 in a hospital at Thomasville, Ga.

Harry E. Barlow, chief engineer of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at St. Paul, Minn., whose death on December 11 was noted in the *Railway Age* of December 21, had been connected with the Omaha continuously for 32 years. He was born on March 25, 1880, at Baraboo, Wis., and was educated in civil engineering at the University of Minnesota. Mr. Barlow entered the service of the Omaha in 1903 as assistant engineer, in which capacity he

Harry E. Barlow

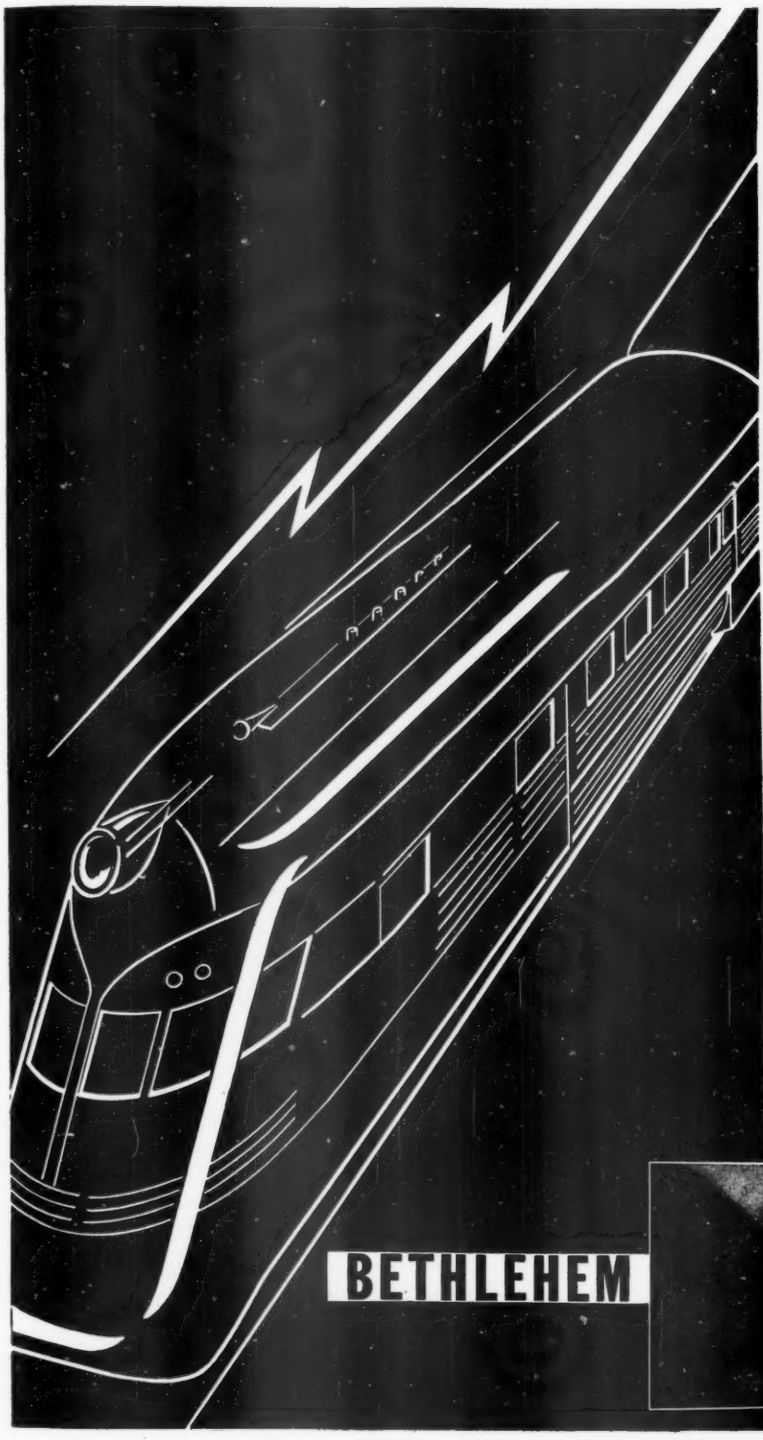
remained until 1920, when he was promoted to chief engineer, the position he was holding at the time of his death.

J. F. Patterson, retired general manager of the New York Zone of the Pennsylvania, with headquarters at New York, died on December 25 at the New York Hospital. Mr. Patterson was born on January 8, 1871, at Alliance, Ohio, and entered the service of the Pennsylvania in October, 1884, as a messenger, serving consecutively until October, 1899, as telegraph operator, train dispatcher at Fort Wayne, Ind., assistant trainmaster at Fort Wayne, and trainmaster. In April, 1914, he was appointed superintendent of the Peoria division of the Vandalia (part of the Pennsylvania) later serving in the same capacity on the Michigan division of the same road, and the Akron division, Erie & Ashtabula division, and the Eastern division of the Pennsylvania. In October, 1923, he was promoted to general superintendent of the Eastern Ohio division, serving in that capacity until July, 1928,

J. F. Patterson

when he was appointed general manager of the Long Island. In the latter part of 1928 Mr. Patterson was appointed general manager of the New York Zone of the Pennsylvania, of which the Long Island is a part. He was relieved from active service because of illness in 1932.

The Stamina needed in track fastenings today



WEIGHT of motive power and speed of operation are climbing. Both impose greater burdens on track fastenings. Both make absolute security even more imperative than heretofore.

The development of the high-tensile track bolt was a long stride toward bringing fastenings up to the level of strength and stamina called for today. The hot-forged nut completes the transition. It provides a fastening with qualities of rugged endurance fully equal to present demands or any likely to develop.

Each Bethlehem Hot-Forged Nut is an individual forging, with the close-knit, sinewy toughness inherent in that method of manufacture. No splitting, no rounding out, no mushrooming. These nuts are right in their element where the service is rigorous. They have a full measure of the staying power needed in all items of railway track and equipment today.

Among other products for railroads manufactured in our Lebanon, Pa., plant are the well-known Bethlehem Heat-Treated Track Bolts and a complete line of related products—frog bolts, engine bolts, corrosion-resisting bolts, track spikes made from new-billet steel, rivets and turnbuckles. Also many specialties to meet railway requirements.

HOT-FORGED NUT

Bethlehem District Offices: Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Indianapolis, Kansas City, Milwaukee, New York, Philadelphia, Pittsburgh, San Antonio, St. Louis, St. Paul, Washington, Wilkes-Barre, York. *Pacific Coast Distributor:* Pacific Coast Steel Corporation, San Francisco, Seattle, Los Angeles, Portland, Salt Lake City, Honolulu. *Export Distributor:* Bethlehem Steel Export Corporation, New York.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

GENERAL OFFICES: BETHLEHEM, PA.

UNIFY SIGNAL ASPECTS WITH G

Even to the dwarf signals, — for SA Search-light Signal mechanisms and cases are standard and completely interchangeable. And every unit can project three powerful indications through its one optical system.

Such unification and simplification is productive of order, increased train crew efficiency, greater safety, reduced signal maintenance costs, and smaller stock inventories.

H G-R-S SEARCH-LIGHT SIGNALS

GENERAL RAILWAY SIGNAL COMPANY

New York Chicago ROCHESTER, N. Y. St. Louis

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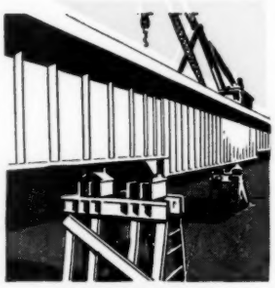
"The UNCEASING

THE frontier days of railroading are history, but there's many a job still to be done in correcting and modernizing the work of the early builders . . . in stopping that "unceasing ooze from every pore" as the eminent Wellington once described the wastes from bad railway location.

Steel has ever been the railroad's trusted weapon in combatting these wastes. This is truer today than it was a generation ago. For steel is now available in more forms, better specialized for their jobs. CB Bearing Piles I-Beam-Lok bridge floor construction, Tiger Brand Wire Rope, Keystone Rust-Resisting Sheets, and scores of other US Steel products, together with the services of the American Bridge Company, today assure the railroads of the most modern and dependable materials of construction. On each, there is information of value and importance to the engineer. Representatives of these companies are always glad to co-operate and to supply facts for your guidance.

Modern Construction

Steel structures of all classes, turntables, transmission towers and component parts • Black and galvanized sheets, automobile sheets, electrical sheets, sheets for special purposes, tin and terne plates; Keystone Rust-Resisting Copper-Steel Products; USS Stainless and Heat-Resisting Steel; USS High Tensile Steel • Wire fencing, barbed wire, wire rope, electrical wires and cables, nails, manufacturing wires, cold rolled strip steel. Springs • Concrete reinforcement • CB Sections, structural shapes, piling, plates, bars, flats, billets • Axles • Wheels • GEO Track Construction • Rails and track material • Cyclone Chain Link Fence—also lawn fence, wire screen cloth, wire belting, and wire specialties • Special Track Work and Accessories • Standard pipe, copper-steel pipe, rotary rolled pipe, electric-welded pipe, hammer-welded



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Ease of driving, faster construction, deeper penetration, and economy have characterized recent installations of these piles in railroad bridge work. There is a range of sections providing capacities for every load.

I-BEAM-LOK BRIDGE FLOOR CONSTRUCTION

A rigid, lighter, more rugged, and less costly combination steel and concrete floor slab based upon the known advantages and strength of the I-beam. Hard, skid-resistant. Quickly erected.

STEEL CONSTRUCTION

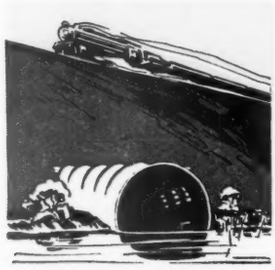
American Bridge Company structures attest to the fact that A.B.C. fabricating and erecting facilities are adequate and the A.B.C. engineering organization competent to meet demands of any job, however large or difficult.

United States

OOZE *from every pore"*

n Materials of Steel

TIGER BRAND WIRE ROPE
Used in every field of application where the jobs are toughest. Ability to stand up under gruelling punishment, marked reduction in replacement cost, constant dependability: these reasons explain its wide use by railroads.



KEYSTONE RUST-RESISTING COPPER-STEEL SHEETS
Years of experience have proved this to be a long-lived and economical material for culverts and other underground services. The base metal is highly rust-resistant; galvanizing by most modern process.

pipe, boiler tubes, seamless mechanical tubing, special dipped and coated pipe, cement-lined pipe, cylinders, couplings • Universal Atlas Cements.

U·S STEEL

AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL & WIRE COMPANY
CARNEGIE-ILLINOIS STEEL CORPORATION
COLUMBIA STEEL COMPANY
CYCLONE FENCE COMPANY
NATIONAL TUBE COMPANY
TENNESSEE COAL, IRON & RAILROAD COMPANY
UNIVERSAL ATLAS CEMENT COMPANY

SCULLY STEEL PRODUCTS COMPANY, *Warehouse Distributors*
UNITED STATES STEEL PRODUCTS COMPANY, *Export Distributors*

tes Steel U·S STEEL *Corporation Subsidiaries*

"CURVES" *to end all* "CURVES"

The FACTS About Railroad Journal Friction

THE charts reproduced on the opposite page show the results of laboratory tests made to determine accurately the relative resistance between standard friction bearings for Railway Journals and Timken Roller Bearings for Railway Journals. They should dispel all doubt as to which type of bearing is superior, and settle this subject once and for all.

THE bearings used in these tests were of the same relative size —6" x 11"—and the tests were carried out under exactly similar conditions of loads and speeds.

VERTICAL loads of 8,000 lbs. per journal, (representing an empty car), 16,000 lbs. per journal (representing a partially loaded car or tender) and 24,000 lbs. per journal (representing a fully loaded car or tender) were imposed on the bearings at speeds ranging from zero (starting) to 78.6 miles per hour.

IT will pay you to study these charts carefully. Note the high starting and running resistance of the friction bearings as compared with the Timken Bearings. Note particularly too, *how the resistance of the friction bearings increases in the higher speed ranges.*

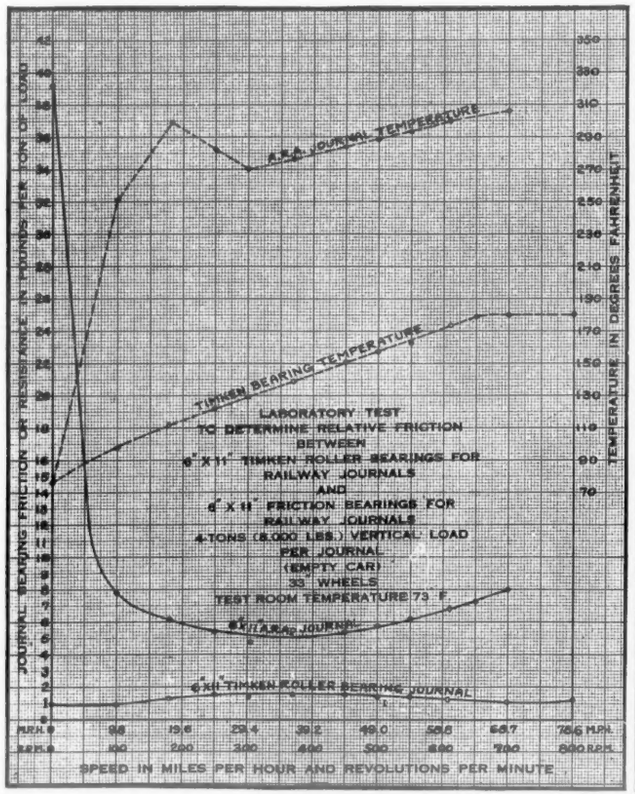
WE were only able to chart the resistance of the friction bearings up to 68.7 M. P. H. in the case of the empty and partially loaded cars and up to 58.8 M. P. H. in the case of the fully loaded car due to the excessive heat generated by the friction bearings.

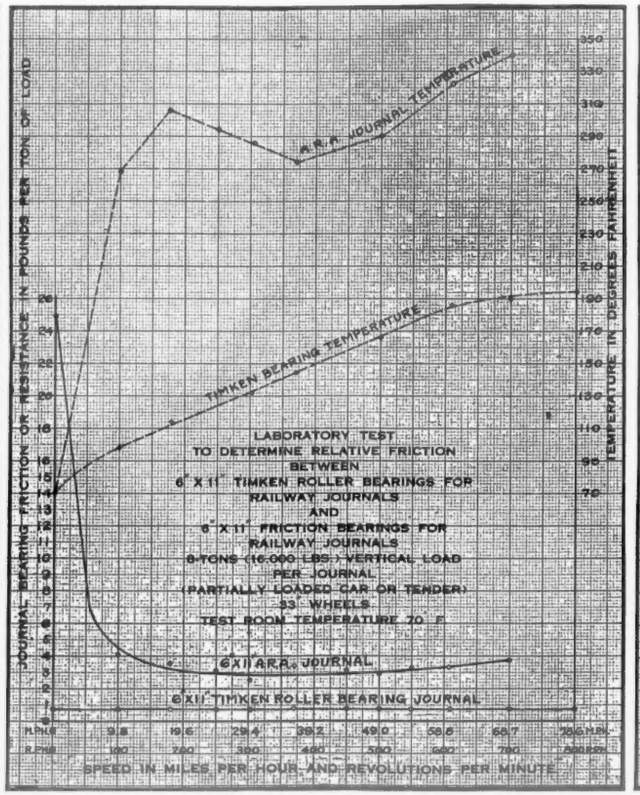
This is No. 1 of a series of charts covering results of laboratory and operating tests of Timken Railroad Bearings. Reprints of these charts will be furnished upon request.

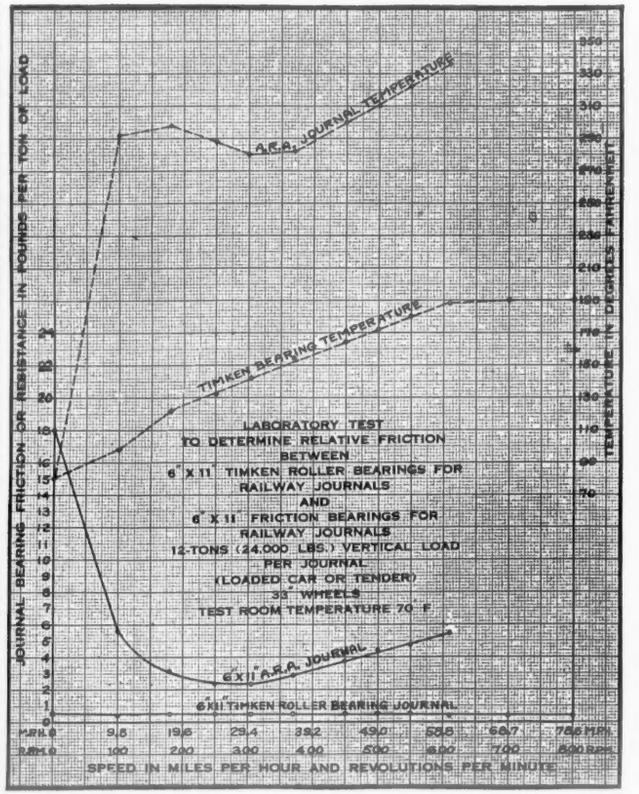
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN TAPERED ROLLER BEARINGS

RESULTS OF LABORATORY TESTS TO DETERMINE RELATIVE FRICTION BETWEEN TIMKEN ROLLER BEARINGS FOR RAILWAY JOURNALS AND FRICTION BEARINGS FOR RAILWAY JOURNALS

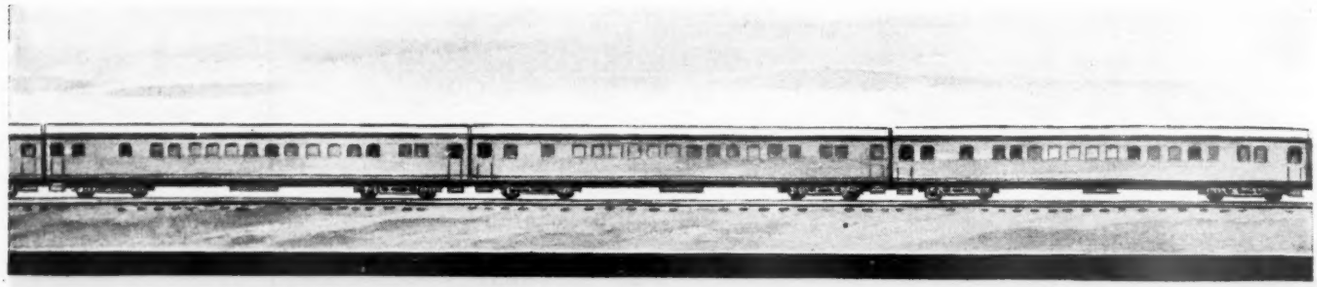

A.R.A. JOURNAL TEMPERATURE
TIMKEN BEARING TEMPERATURE
LABORATORY TEST
TO DETERMINE RELATIVE FRICTION
BETWEEN
6" X 11" TIMKEN ROLLER BEARINGS FOR
RAILWAY JOURNALS
AND
6" X 11" FRICTION BEARINGS FOR
RAILWAY JOURNALS
4-TONS (8,000 LBS.) VERTICAL LOAD
PER JOURNAL
(EMPTY CAR)
33" WHEELS
TEST ROOM TEMPERATURE 73° F.
6"X11" A.R.A. JOURNAL
6"X11" TIMKEN ROLLER BEARING JOURNAL
JOURNAL BEARING FRICTION OR RESISTANCE IN POUNDS PER TON OF LOAD
TEMPERATURE IN DEGREES FAHRENHEIT
SPEED IN MILES PER HOUR AND REVOLUTIONS PER MINUTE


A.R.A. JOURNAL TEMPERATURE
TIMKEN BEARING TEMPERATURE
LABORATORY TEST
TO DETERMINE RELATIVE FRICTION
BETWEEN
6" X 11" TIMKEN ROLLER BEARINGS FOR
RAILWAY JOURNALS
AND
6" X 11" FRICTION BEARINGS FOR
RAILWAY JOURNALS
8-TONS (16,000 LBS.) VERTICAL LOAD
PER JOURNAL
(PARTIALLY LOADED CAR OR TENDER)
33" WHEELS
TEST ROOM TEMPERATURE 70° F.
6"X11" A.R.A. JOURNAL
6"X11" TIMKEN ROLLER BEARING JOURNAL
JOURNAL BEARING FRICTION OR RESISTANCE IN POUNDS PER TON OF LOAD
TEMPERATURE IN DEGREES FAHRENHEIT
SPEED IN MILES PER HOUR AND REVOLUTIONS PER MINUTE


A.R.A. JOURNAL TEMPERATURE
TIMKEN BEARING TEMPERATURE
LABORATORY TEST
TO DETERMINE RELATIVE FRICTION
BETWEEN
6" X 11" TIMKEN ROLLER BEARINGS FOR
RAILWAY JOURNALS
AND
6" X 11" FRICTION BEARINGS FOR
RAILWAY JOURNALS
12-TONS (24,000 LBS.) VERTICAL LOAD
PER JOURNAL
(LOADED CAR OR TENDER)
33" WHEELS
TEST ROOM TEMPERATURE 70° F.
6"X11" A.R.A. JOURNAL
6"X11" TIMKEN ROLLER BEARING JOURNAL
JOURNAL BEARING FRICTION OR RESISTANCE IN POUNDS PER TON OF LOAD
TEMPERATURE IN DEGREES FAHRENHEIT
SPEED IN MILES PER HOUR AND REVOLUTIONS PER MINUTE

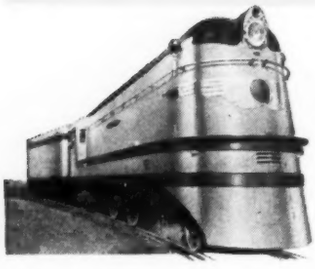
This is No. 1 of a series of charts covering results of laboratory and operating tests of Timken Railroad Bearings. Reprints of these charts will be furnished upon request.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO



ARMCO H.T.-

steel created expressly for

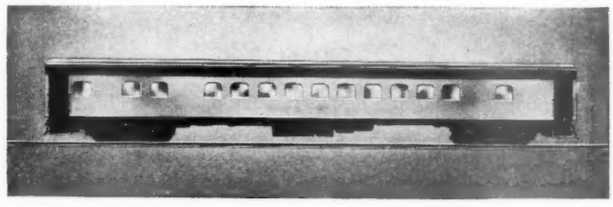


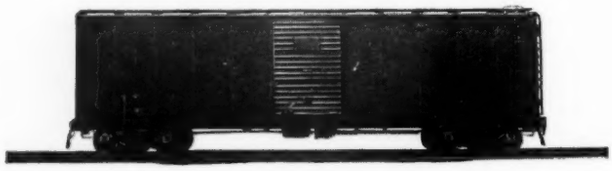
RAILROAD executives and engineers will see in ARMCO H.T.-50 a satisfactory answer to one of their vital problems — a special steel that fully meets increased physical requirements; that possesses a good surface; that may be fabricated and welded without difficulty; and that exceeds by a generous margin the atmospheric corrosion resistance of copper-bearing steel.

Let us see how ARMCO H.T.-50 fits into your new car-construction and repair programs. It was purposely made with forming operations in mind. The ability of steel to be formed is related to the ductility or yield point as well as operation of dies, speed of bending, and other practices. All these factors, and more, had a definite bearing on the development of ARMCO H.T.-50.

Strength also had a great deal to do with the evolution of this special high-tensile steel. Factors of safety and deflection really dictate the useful strength of steel. Nowadays there are few practical uses for steel possessing a yield point above 50,000 lbs. per sq. in. This is why ARMCO H.T.-50 is made expressly to conform with modern engineering practice.

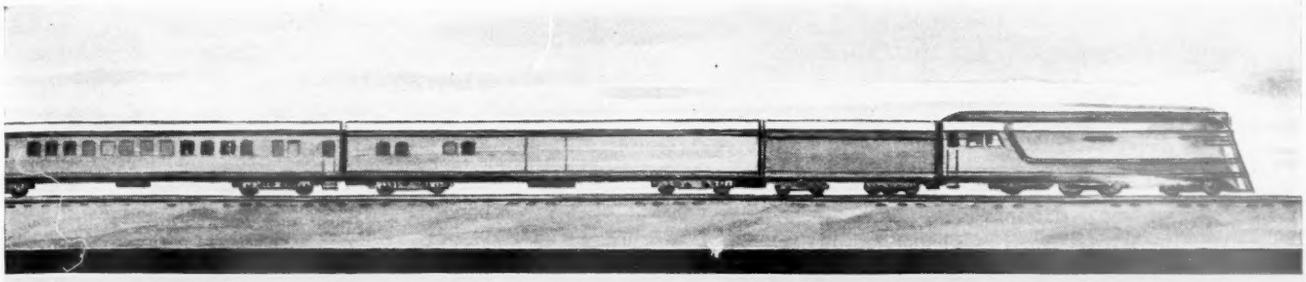
It is no longer necessary or desirable to increase the strength of car steels by the simple expedient of adding carbon and manganese. ARMCO H.T.-50 adequately solves the welding evils that attended the use of these outmoded metals. This steel embodies other agents that make it equal in strength to the higher carbon steels





ARMCO FLAT-ROLLED STEEL

GRADES FOR ALL RAILROAD NEEDS

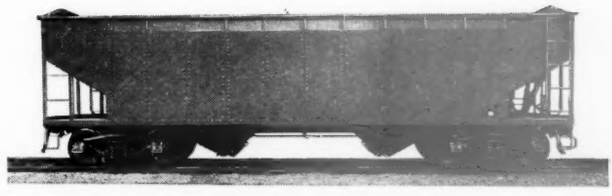


-50 a special high-tensile today's transportation needs

without dangerous embrittlements in the region of the weld. Tensile tests reveal that welded ARMCO H.T.-50 sheets have the same yield point and tensile strength as unwelded sheets. Keeping the carbon content low contributes to sound, tough welds.

Carefully-conducted experiments over several years indicate that ARMCO H.T.-50 has from four to six times the atmospheric corrosion resistance of ordinary steel. Here is a material that fulfils the demands of designers for a longer-lasting steel with definite, uniform physical properties.

The fabricating qualities of ARMCO H.T.-50 are excellent. The sheets are suitably ductile, and shear, punch and form readily both hot and cold. The working of this greatly-improved special steel calls for no revamping of shop equipment or changes in practice.



You will want to consider ARMCO H.T.-50 for your freight and passenger cars. It offers measurable economies, both in fabrication and service. We shall be glad to review your individual requirements in detail, recommending the proper sheet for each part and considering such factors as surface, flatness, forming, welding and physical properties. Any of the following offices will gladly give you detailed information.

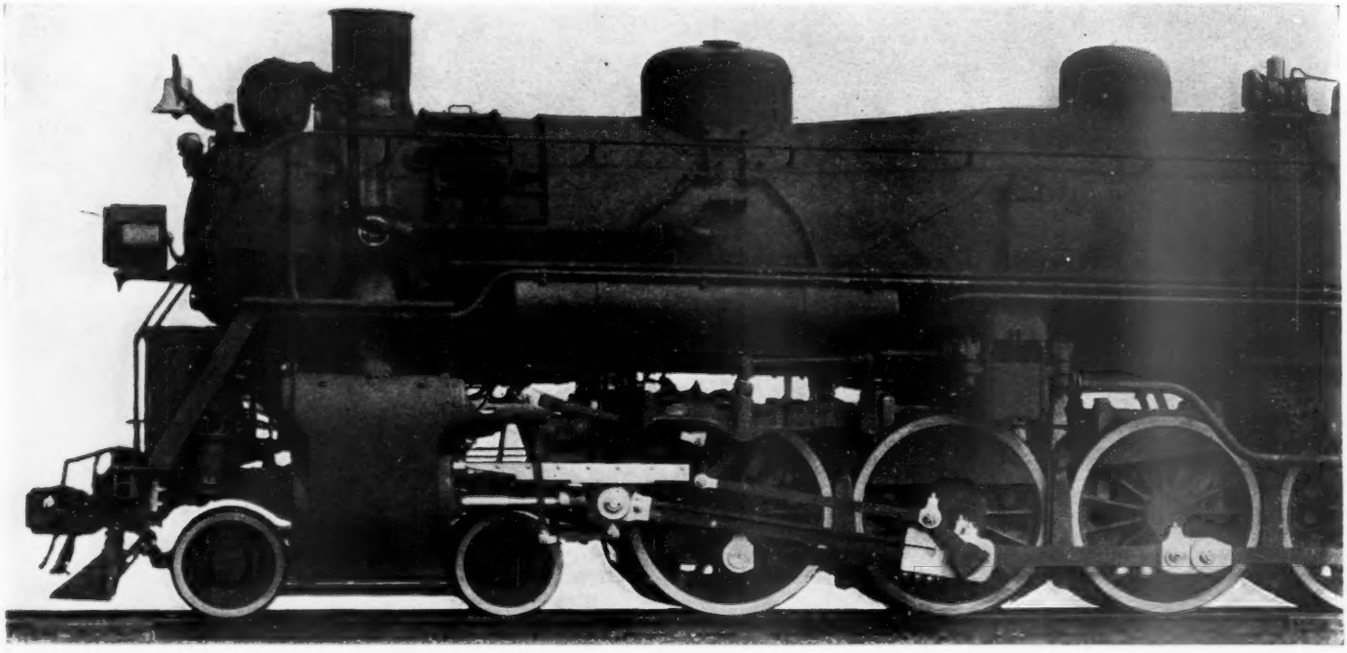
ARMCO RAILROAD SALES CO.
Subsidiary of The American Rolling Mill Company
Executive Offices: MIDDLETOWN, OHIO • District Offices: CHICAGO • CLEVELAND • DETROIT • NEW YORK • PHILADELPHIA • ST. LOUIS • SAN FRANCISCO • DENVER • DALLAS

TYPICAL PHYSICAL PROPERTIES

	HOT-ROLLED	COLD-ROLLED
Yield Point: lbs. per sq. in.	47,000	52,000
Tensile Strength: lbs. per sq. in.	67,000	70,000
Elongation in 2", per cent	28	25

ARMCO

ARMCO H.T.-50



FIVE BALDWIN LOCOMOTIVES

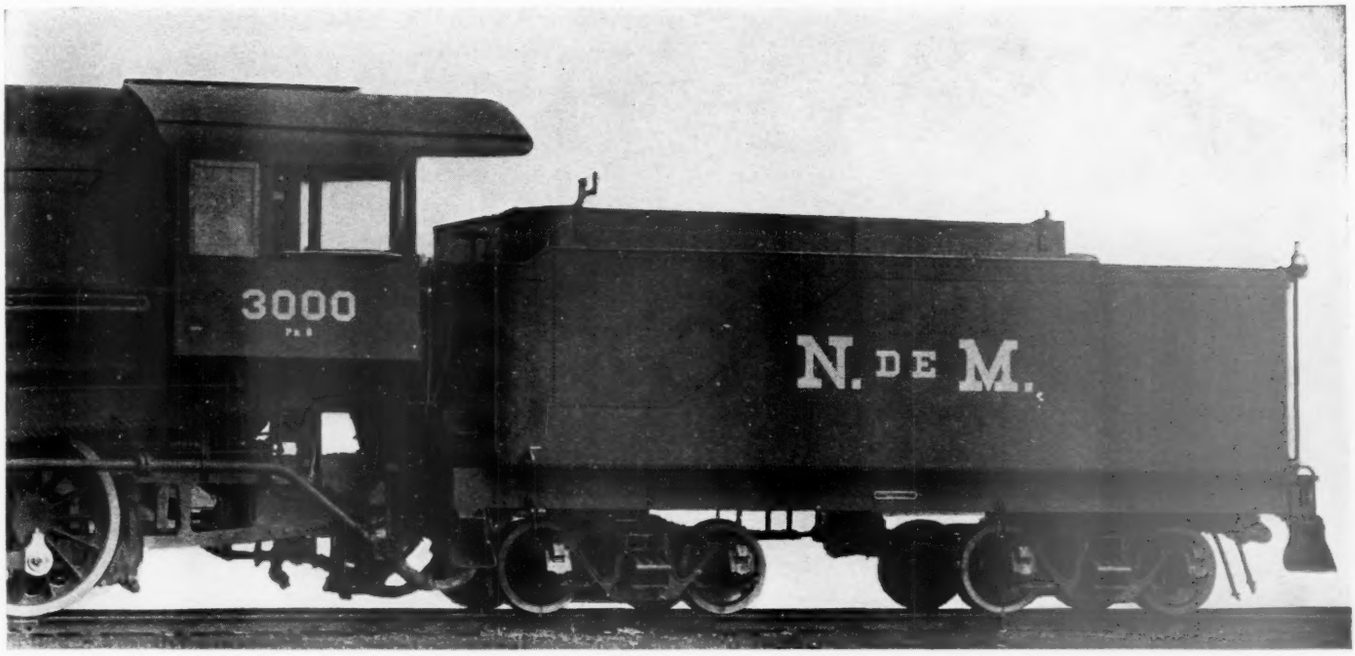
for the

NATIONAL RAILWAYS OF MEXICO

(BUILT 1935)

It takes Modern Locomotives

THE BALDWIN



Almost eighty years have passed since Baldwin built its first locomotive for service in Mexico.

The National Railways of Mexico placed their first order with Baldwin in 1881 while the road was still under construction. From that day on, large numbers of Baldwin locomotives have served this railway with distinction.

The new locomotives, one of which is shown above, have already been placed in passenger service between Mexico City and Nuevo Laredo.

to make money these days!

LOCOMOTIVE WORKS
PHILADELPHIA

"I HELP PROTECT YOUR GOOD NAME"

"PUBLIC RELATIONS" are important—and avoidance of irritations to patrons is the first axiom in building good will. With $8,000 to $10,000 per car investment in air-conditioning, investment in Edison Batteries to provide "comfort insurance" is both good economy and good public relations.

No one ever challenges the fact that Edison Batteries are more dependable. They are known not to fail unexpectedly between car shoppings. And, where per-year costs and maintenance costs are checked, they prove real dollars-and-cents-thrifty to the railroad. Further, with rising prices regarded as inevitable, investment in Edison Batteries now means protection against higher battery prices for years to come. (Edison Batteries live 2 to 5 times as long.)

If the latest batteries-in-air-conditioning data isn't on your desk now, please tell us so we can send you your copy of "Comfort Insurance".

EDISON storage BATTERY

DIVISION OF THOMAS A. EDISON, INC., WEST ORANGE, NEW JERSEY

Springs

SERVICE RECORDS COUNT MOST

In the choice of springs nothing deserves more consideration than service records.

What the springs are doing under the most trying conditions of use points quite definitely to the wise selection.

Experienced users of springs in the railroad and industrial fields well know the long and satisfactory service given by American Steel Foundries springs. They know that they can count on the highest degree of reliability and are not taking chances on material or workmanship.

Repaired springs are rebuilt to the same rigid specifications and by the same skilled workmen under expert supervision as those used in the manufacture of new springs, and will give the same high standard of performance.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

Specify—WELDED PIPING

Pipe welding specifications are in this book!

AIRCOWELDING is especially fit for the railroad field because of the speed and economy it introduces to pipe welding. Welding time is cut in half and a saving of 30 to 50% is made on rods and gases. For best results in new pipe line construction, for convenience in making alterations and for pipe maintenance in Railroad Power Houses, Shop Buildings and Steam Lines, investigate AIRCOWELDING.

"FACTS ABOUT WELDED PIPING" sets forth in handy form for Maintenance of Way Engineers the specifications for welded piping as well as its many advantages — and the reasons for these substantial savings. Outlined also is the AIRCOBRAZE Process with Walseal Fittings.

The Coupon will bring you a copy of this interesting book . . . Mail it NOW!

AIR REDUCTION SALES CO.
60 EAST 42nd ST. NEW YORK CITY

Send me a complimentary copy of "THE FACTS ABOUT WELDED PIPING." R.A.1
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FIRM.....
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CITY.....STATE.....

What is the POWER CONSUMPTION?

In choosing a system of mechanical air conditioning the most important question, after performance and maintenance, is "What is the power consumption?"

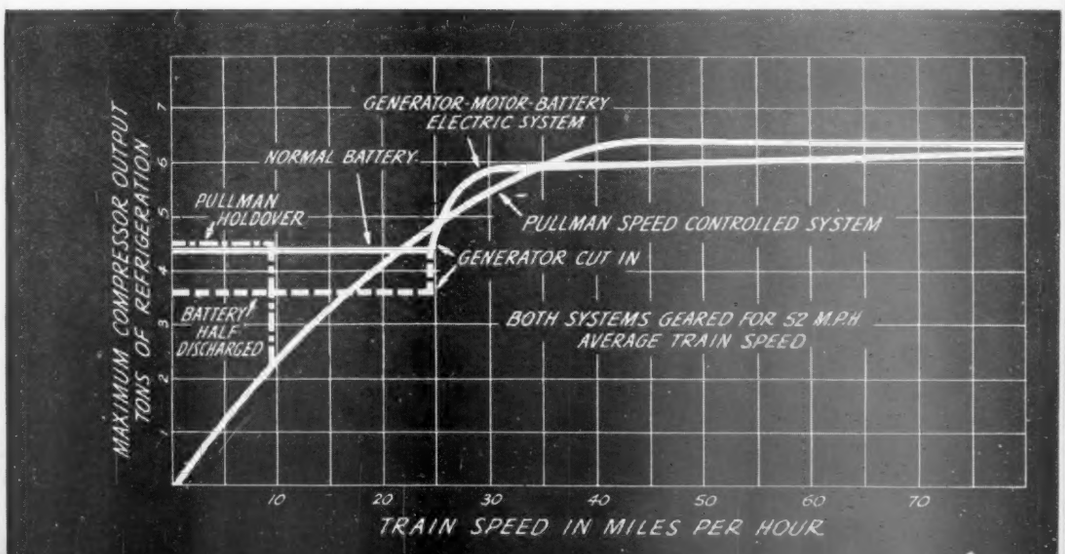
Power to operate the Pullman System is transmitted from axle to compressor through a direct shaft drive . . . a drive that is more economical in the use of power than any other now available.

At one end of the shaft drive is a Speed Control which has an average power efficiency of 85% when governing. However, it acts as a straight mechanical drive at all except high speeds.

The elimination of large auxiliary equipment in the power transmission of the Pullman System effects a reduction in weight . . . again lowering power consumption.

PULLMAN-STANDARD CAR MANUFACTURING COMPANY

CHICAGO • PITTSBURGH • WASHINGTON, D. C. • NEW ORLEANS • CLEVELAND
HOUSTON • BALTIMORE • BIRMINGHAM • NEW YORK • WORCESTER, MASS.
San Francisco . . . Sales Representative . . . Latham McMullin, Russ Building



Showing the power taken from the locomotive for pulling a generator-motor-battery drive and for pulling a Pullman direct drive.

PULLMAN AIR CONDITIONING SYSTEM

Above: The 1½- to 2-ton Model C-35 International, typical of this line of quality trucks that have such dependable performance and economical operation built into them.

While the Entire Truck Industry Gains 29%
International Trucks Register Remarkable Gain of 73%

As this announcement goes to press R. L. Polk & Company, official statisticians of the automotive industry, provide U. S. new-truck registration data for the first nine months in 1935 against the same period in 1934. International advances 73.3%—all trucks together advance 28.6%. No other leading truck, regardless of size or price, equals the gain made by International.

Trucks are bought for practical reasons, and the rising tide of demand is for INTERNATIONAL. Fix that emphatic preference in your mind when you buy trucks. Make your truck investment simple, safe, and sure. The 231 International branches (largest Company-owned truck service organization in the world), and thousands of dealers, are at your command with International Trucks for all hauling needs. Write us for new 64-page booklet, "I Drive Safely."

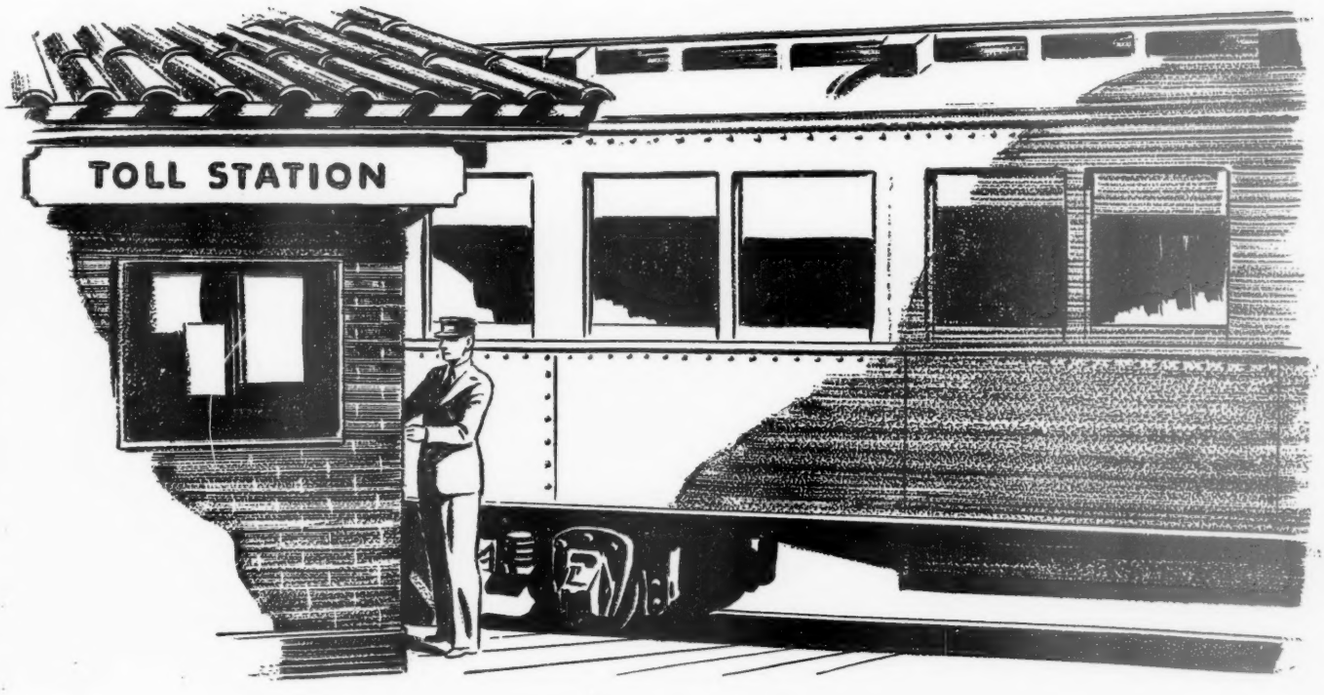
International sizes range from Light-Delivery to powerful Tractor-Trucks, starting with ½-ton 6-cylinder chassis at

$400 f. o. b. factory

Consult any International Branch or Dealer

INTERNATIONAL HARVESTER COMPANY
606 So. Michigan Ave. OF AMERICA (Incorporated) Chicago, Illinois

INTERNATIONAL TRUCKS



Paying PASSENGER TOLL

WHEN a conventional locomotive pulls a string of standard steel passenger cars a toll is exacted for every passenger carried. That toll is paid in *weight*. Weight that demands added power . . . that wears down the right-of-way . . . that means extra expense in every phase of operation. This toll, among the railroads of America, may approximate half-a-billion dollars per year.

A standard locomotive, generating power to pull ten 160,000-pound coaches, can, with the same amount of power, pull *twenty* light-weight stainless-steel cars weighing only half as much. Why, with the present reduction in passenger traffic, increase expense by paying a toll for unnecessary weight—particularly when these sturdy light-weight cars meet every requirement for strength and safety?

By January 1, 1936, five truly light-weight stainless-steel trains built by Budd will have traveled 873,010 miles. Performance records have proved beyond doubt their practicability and efficiency. Most important—they have shown that, with the right type of equipment, there is a profit in passenger traffic.

SPEED WITH SAFETY

EDW. G. BUDD MANUFACTURING COMPANY

RAILWAY DIVISION—PHILADELPHIA

"You can fool some of the people some of the time..."

NOW that air-conditioned trains are offered by all of the first class railroads of the United States, these trains have ceased to be a novelty. The public is comparing the air-conditioning of one train with another, and patronizing the railroads affording the most *comfortable* air-conditioning.

Travelers know nothing about the manner in which the air-conditioning is caused—but they do know when the car is drafty or evil-smelling or when they are drugged by stale air which is charged with carbon dioxide.

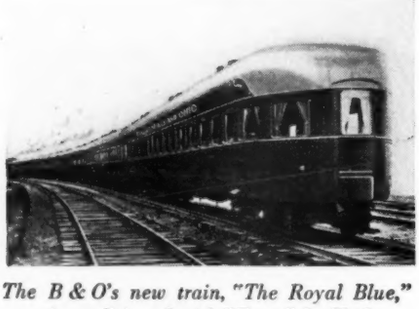
Many railroads have made a mistake—they have fooled themselves, not the public—by installing systems in which the air is introduced into the car at too great a velocity, creating drafts; systems which do not cause perfect mixing and distribution of air; systems which depend upon a small amount of ice to produce the cooling effect.

Money has been saved, no doubt, in initial cost; but it is "penny-wise pound-foolish" money, and will never help pay dividends.

The wise railroad managements have installed "Freon" mechanical air-conditioning with adequate distribution ducts for low velocity air. These systems are an investment—not a temporary expedient to help fool the people into the trains for one ride.

It is time that the railroads which have invested in low price expedients make a consumer survey to determine the loss of business to competing lines offering the perfect "Freon" mechanical air-conditioning.

Over 99% of all mechanically air-conditioned trains are air-conditioned with "Freon."



The B & O's new train, "The Royal Blue," air-conditioned with "Freon" by York.

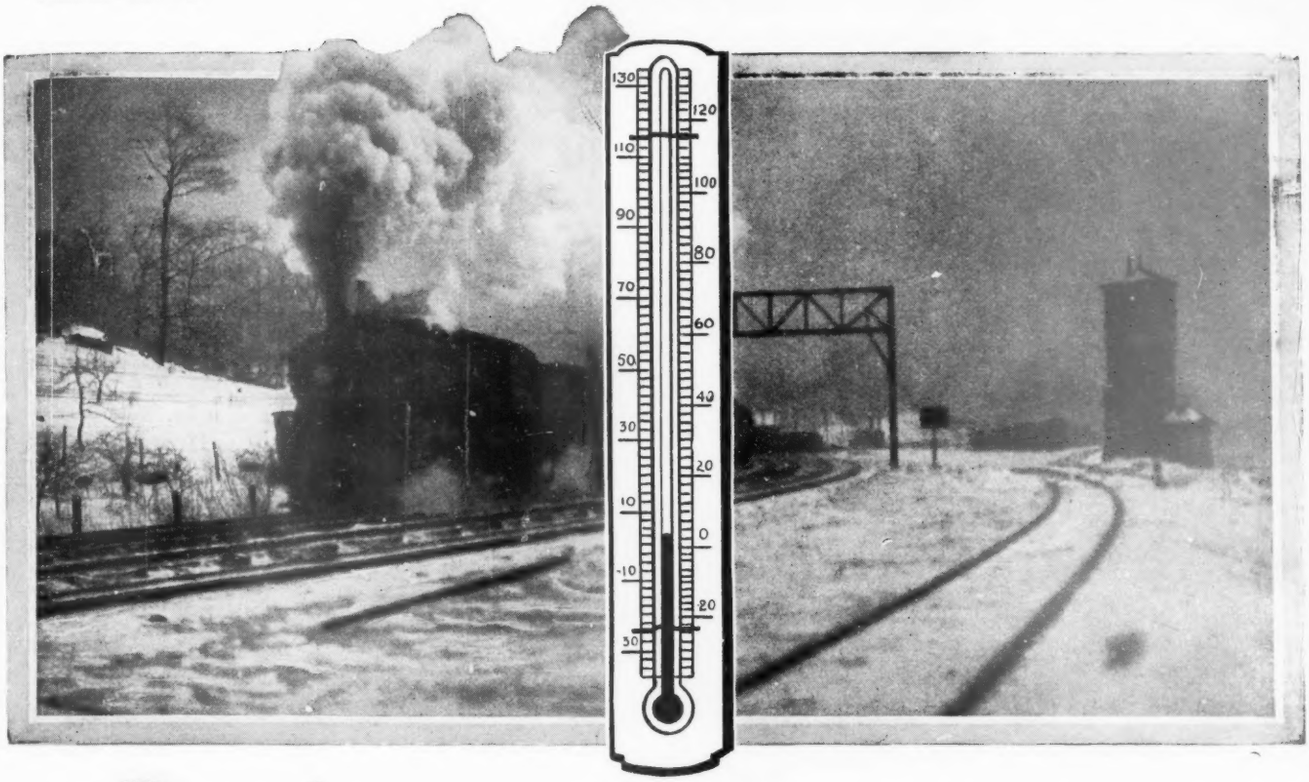
KINETIC

FREON

REG. U. S. PAT. OFF.

a safe refrigerant

KINETIC CHEMICALS, INC., TENTH & MARKET STREETS, WILMINGTON, DELAWARE



Duplex Packing

Duplex Sectional Packing
For Locomotive Valves

Duplex Sectional Packing
For Locomotive Cylinders

"Pack up your Troubles and Smile - Smile - Smile"

APPLICATION of HUNT-SPILLER *Duplex* Sectional Packing in the valves and cylinders of your locomotives will prove to be a most important factor in the economical operation of your power this Winter.

Duplex Packing will prevent those leaks and blows which reduce cylinder horsepower and waste fuel. It will reduce expensive inspection and renewals at a time when your maintenance forces are almost buried with extra work.

Every locomotive that you equip with *Duplex* Packing means less maintenance trouble, fewer delays, lower fuel consumption and bigger earnings during the cold Winter months.

HSGI
Reg. U. S. Trade Mark
Cylinder Bushings
Cylinder Packing Rings
Pistons or Piston Bull Rings
Valve Bushings
Valve Packing Rings
Valve Bull Rings
Crosshead Shoes
Hub Liners
Shoes and Wedges
Floating Rod Bushings
Parts Finished For Application
Dunbar Sectional Type Packing
Duplex Sectional Type Packing for Cylinders and Valves
(Duplex Springs for Above
Sectional Packing)
Cylinder Snap Rings
Valve Rings All Shapes

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HUNT-SPILLER GUN IRON

Air Furnace

KERITE
in three-quarters of a century of continuous production, has spun out a record of performance that is unequalled in the history of insulated wires and cables
DAYS KERITE
THE KERITE INSULATED WIRE & CABLE COMPANY INC
NEW YORK CHICAGO SAN FRANCISCO

MAGNUS COMPANY

(INCORPORATED)

Journal Bearings

AND

Bronze Engine Castings

New York Chicago

NATIONAL CARBIDE

LANTERNS and National Carbide V. G. Flarelights —the highest development in carbide lighting equipment.

Lanterns with blue rear light for car inspection — with red rear light for motor car headlights and signal lights — handy lamps and portable lights for track maintenance —standard on many railroads.

Y-199 Handy Light

WLI-CI Lantern

NATIONAL CARBIDE SALES CORP.
LINCOLN BLDG., 60 EAST 42ND ST., NEW YORK, N.Y.

Pittsburgh Spring & Steel Co.

1417 Farmers Bank Building, Pittsburgh, Pa.

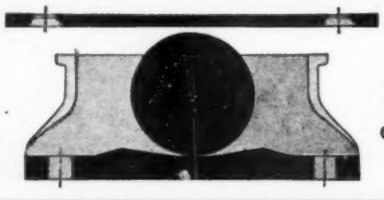
Makers of Elliptic and Spiral SPRINGS of Every Description

Carbon, Vanadium, Silico-Manganese Steels.
Licensed manufacturers under patents for "Coil-Elliptic" groupings.

Washington, D. C. 824 Union Trust Bldg. | New York 3723 Grand Central Terminal | Chicago 1401 Fisher Bldg.

EDGEWATER STEEL COMPANY
PITTSBURGH, PA.

Details of our products appeared in the following issues of *Railway Age* during 1933, 1934, 1935:
1933—June 3, 24—July 1, 22—Sept. 2—Oct. 7, 28—Nov. 4—Dec. 2
1934—Jan. 6, 27—Feb. 17—March 3—April 7, 21—May 5, 19—June 2, 9, 16, 30—Oct. 12—Nov. 3—Dec. 1
1935—Jan. 5, 26—Feb. 2, 16—March 16—April 6—May 11—June 15, 22, 29—July 20, 27—Aug. 24—Oct. 5—Nov. 2, 30



STUCKI SIDE BEARINGS
Manufactured by
A. Stucki Co.
Oliver Bldg., Pittsburgh, Pa.
Canadian Representatives
The Holden Co., Ltd.
Montreal, Can.

THE BUCKEYE STEEL CASTINGS CO.
COLUMBUS, OHIO

MANUFACTURER of Side Frames and Bolsters for 4-Wheel and 6-Wheel Freight Cars and Locomotive Tenders, A. A. R. Couplers, Yokes and Car Castings.

Steam and Electric Specialties for Passenger Car Heating

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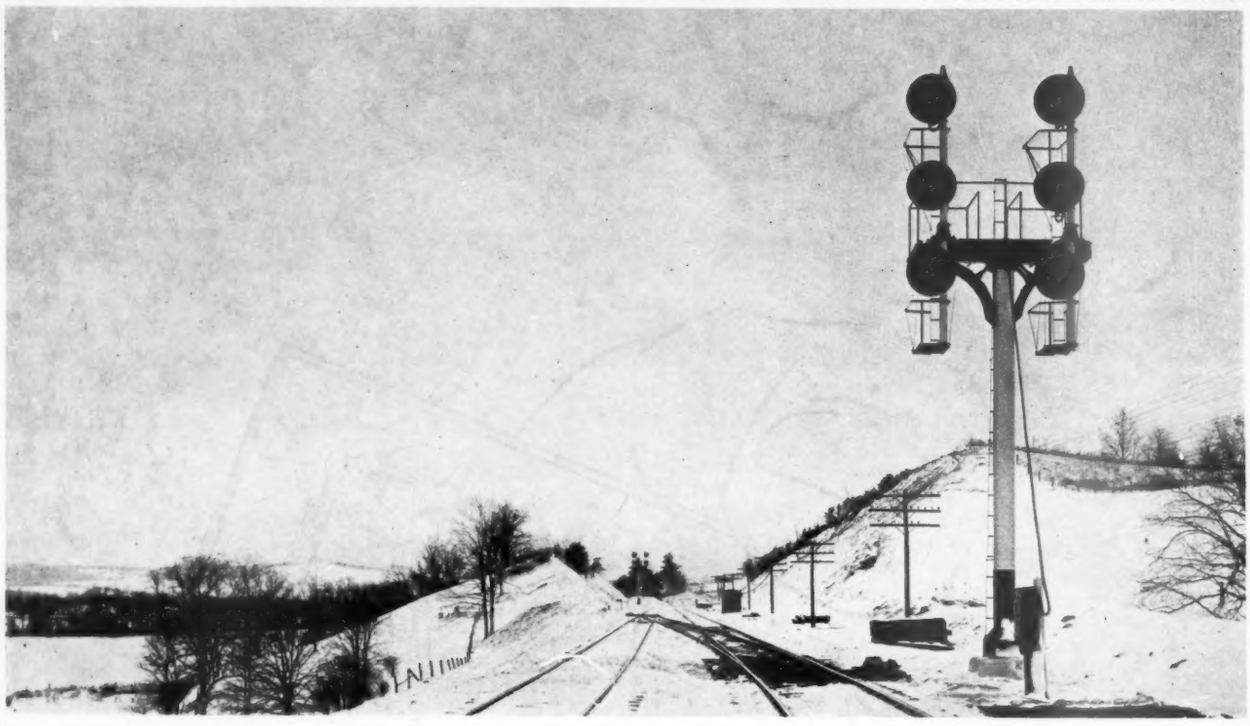
GREETINGS
and Good Wishes for
a Happy and Prosperous
NEW YEAR
WESTINGHOUSE AIR BRAKE CO.



1936

One of the real joys of the holiday season
is the opportunity to put aside the every-day
business routine of setting forth the
benefits derived from modern signaling
and with deep feeling, wish our friends
a Happy and Prosperous New Year.

UNION SWITCH & SIGNAL COMPANY
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GENERAL RAILWAY SIGNAL COMPANY
Rochester, N. Y.

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HISTORY IN THE MAKING

While in the early 19th century signaling was installed for safety in railway operation, signaling in this 20th century provides not only safety in operation, but also economy and efficiency.